DOCUMENT RESUME

ED 168 426 HE 011 131

TITLE Nutrition Education in Medical Schools. Hearing Before the Subcommittee on Nutrition of the Committee on Agriculture, Nutrition, and Forestry, United States Senate. Ninety-Fifth Congress, Second Session on Current Status, Impediments, and Potential Solutions. September 20, 1978.

INSTITUTION Congress of the U.S., Washington, D.C. Senate Committee on Agriculture, Nutrition, and Forestry.

PUB DATE 20 Sep 78

NOTE 124p.; Not available in hard copy due to marginal legibility of original document

AVAILABLE FROM Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402

EDRS PRICE MF01 Plus Postage. HC Not Available from EDRS.

DESCRIPTORS Animal Science; *Curriculum Development; Educational Objectives; Higher Education; Hospitals; *Medical Education; *Medical Schools; Needs Assessment; *Nutrition Instruction; Tests; Veterinary Medicine

IDENTIFIERS National Board of Medical Examiners; University of Texas

ABSTRACT

Testimonies and articles, letters, and statements from a congressional hearing of the U.S. Senate concerning nutrition education in medical schools are presented. The hearing was held to ascertain the present status of nutrition instruction in U.S. medical schools, to determine the need for such instruction, and to identify problems with implementation. Opening statements of Senators Henry Bellmon and Bob Dole are followed by statements of educators and experts. Aaron M. Altschul offers a concept of nutrition education, and Charles E. Butterworth addresses hospital malnutrition and nutrition education. Robert B. Wilson covers the following areas: animal products as food supply, the role of the veterinarian in maintaining the supply of food for people, the relationship between nutritional diseases and animal production, and the state of nutritional education in veterinary schools. John Sandson discusses why nutrition in many medical schools has been poor, and Eleanor A. Young reviews the study of nutrition at the University of Texas Health Center in San Antonio. Jack Metcoff addresses objectives and strategies of pursuing nutrition education, and Jack Rutledge discusses nutrition education from the perspective of a medical student. William D. Holden speaks about examinations and the role of the National Board of Medical Examiners. Additional comments, a study on hospital malnutrition, and supplementary materials are included. (SW)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED168426

HE

NUTRITION EDUCATION IN MEDICAL SCHOOLS

HEARING

BEFORE THE

SUBCOMMITTEE ON NUTRITION

OF THE

COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY
UNITED STATES SENATE

NINETY-FIFTH CONGRESS

SECOND SESSION

ON

CURRENT STATUS, IMPEDIMENTS, AND POTENTIAL SOLUTIONS

SEPTEMBER 20, 1978

PART I

Printed for the use of the Committee on Agriculture, Nutrition, and Forestry

HE 011 131

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

U.S. GOVERNMENT PRINTING OFFICE
35-877 O WASHINGTON : 1978

COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY

HERMAN E. TALMADGE, Georgia, *Chairman*

JAMES O. EASTLAND, Mississippi
GEORGE McGOVERN, South Dakota
WALTER D. HUDDLESTON, Kentucky
DICK CLARK, Iowa
RICHARD B. STONE, Florida
PATRICK J. LEAHY, Vermont
EDWARD ZORINSKY, Nebraska
JOHN MELCHER, Montana
KANEASTER HODGES, Jr., Arkansas
MARYON ALLEN, Alabama

BOB DOLE, Kansas
MILTON R. YOUNG, North Dakota
CARL T. CURTIS, Nebraska
HENRY BELLMON, Oklahoma
JESSE HELMS, North Carolina
S. I. HAYAKAWA, California
RICHARD G. LUGAR, Indiana

HENRY J. CASSO, *Staff Director*

SUBCOMMITTEE ON NUTRITION

GEORGE McGOVERN, South Dakota, *Chairman*

PATRICK J. LEAHY, Vermont
JOHN MELCHER, Montana

BOB DOLE, Kansas
HENRY BELLMON, Oklahoma
JESSE HELMS, North Carolina

CONTENTS

CHRONOLOGICAL LIST OF WITNESSES

Page

Bellmon, Hon. Henry, a U.S. Senator from Oklahoma, opening statement 1

Dole, Hon. Bob, a U.S. Senator from Kansas 2

Altschul, Dr. Aaron M., professor and head, Division of Nutrition, Department of Community and Family Medicine, Georgetown University Medical School; Dr. Charles E. Butterworth, professor and chairman, Department of Nutrition Sciences. University of Alabama, Birmingham, Ala.; and Dr. Robert B. Wilson, professor and chairman, Department of Veterinary Microbiology and Pathology, Washington State University, Pullman, Wash. 3

Sandson, John, M.D., dean, School of Medicine, Boston University, Boston, Mass.; Eleanor A. Young, Ph. D., associate professor, Division of Human Nutrition, University of Texas Health Science Center, San Antonio, Tex.; Jack Metcoff, M.S., M.D., George Lynn Cross Research Professor, Department of Pediatrics, Biochemistry, and Molecular Biology, University of Oklahoma, Oklahoma City, Okla.; and Jack Rutledge, medical student, Duke University Medical School, Durham, N.C. 23

Holden, William D., M.D., member of the executive committee of the National Board of Medical Examiners; chairman of the Board's Advisory Committee on Research and Development, Cleveland, Ohio 41

ADDITIONAL ARTICLES, LETTERS, AND STATEMENTS

Dole, Hon. Bob, a U.S. Senator from Kansas, statement 49

Altschul, Aaron M., Ph. D., professor and director, Division of Nutrition, Department of Community and Family Medicine, Georgetown University School of Medicine, statement 50

Butterworth, Charles E., M.D., professor and chairman, Department of Nutrition Sciences, University of Alabama, Birmingham, Ala., statement 53

  Additional material supplied by Dr. Butterworth:

    "Hospital Malnutrition: A Prospective Evaluation of General Medical Patients During the Course of Hospitalization" 54

Wilson, Robert B., D.V.M., Ph. D., professor and chairman, Veterinary Microbiology and Pathology, Washington State University, Pullman, Wash., statement 63

Sandson, John I., M.D., dean, Boston University School of Medicine, Boston, Mass., statement 67

Young, Eleanor A., Ph. D., associate professor and codirector, Division of Human Nutrition, Department of Medicine, The University of Texas Health Science Center, San Antonio, Tex., statement with attached appendixes 1–4 69

Metcoff, Jack, M.S., M.D., M.P.H., George Lynn Cross Research Professor of Pediatrics, Biochemistry and Molecular Biology, University of Oklahoma Health Sciences Center, Oklahoma City, Okla., statement 85

Holden, Dr. William D., National Board of Medical Examiners, additional material submitted by 89

Rutledge, Jack, president, American Medical Student Association, Duke University Medical School, Durham, N.C., statement 92

Four additional questions asked each witness in writing by Senator Bellmon and their answers thereto 95

Page

Sammons, James H., M.D., American Medical Association, letter to Senator McGovern 106

Additional material submitted by Dr. Sammons:

"The Current Status of Nutrition in Medical Curricula: Changes Since the 1976 Survey" 107

"Nutrition Content in Medical Curricula: A Survey Indicates That Nutrition Training Is Increasing in U.S. Medical School Curricula," from the Journal of Nutrition Education, by Cathy K. Cyborski 111

Editorial: "More on Nutrition In Medical Schools," from the Journal of the American Medical Association, by Cathy Kapica Cyborski 113

NUTRITION EDUCATION IN MEDICAL SCHOOLS

WEDNESDAY, SEPTEMBER 20, 1978

U.S. Senate,
Subcommittee on Nutrition of the
Committee on Agriculture, Nutrition, and Forestry,
Washington, D.C.

The subcommittee met, pursuant to notice, at 9:06 a.m., in room 1318, Dirksen Senate Office Building, Hon. Henry Bellmon, presiding.

Present: Senators Leahy, Dole, and Bellmon.

STATEMENT OF HON. HENRY BELLMON, A U.S. SENATOR FROM OKLAHOMA

Senator **Bellmon**. Good morning.

The Nutrition Subcommittee of the Senate Agriculture Committee will come to order. This morning's hearing is being held to ascertain the present status of nutrition instruction in the Nation's medical schools, to determine the need for such instruction, and to identify problems with implementation. We hope that our witnesses will be able to guide us in these concerns. While the Senate has already taken a step in the direction of providing funding for nutrition education for medical professionals, the nature and extent of the need for this curriculum addition as well as the most effective means of educating medical professionals about nutrition are not entirely clear. We are fortunate to have three distinguished panels of experts this morning to clarify these questions.

Speaking as one Senator, I am impressed with the potential savings in terms of human life as well as public funds which might be realized if the influence of our physicians could be increased through added competence in nutrition and nutrition counseling. Certainly, the link between diet and health is becoming clearer each day, and it is also clear that most Americans look to their private physicians for guidance in diet problems.

I find it difficult to believe that we will ever make substantial progress in reducing illnesses related to improper diet until we have the informed and enthusiastic influence of our physicians working for us.

Unless physicians recognize and utilize the strengths of sound nutrition, it would seem apparent that such professionals as dietitians and nutritionists in hospitals and other patientcare settings will not be able to practice their crafts effectively.

Furthermore, incorrect and even extravagant claims about diets are being made in some of the popular media which mislead the public, cause harm, and even result in death, as in the case of the liquid protein incidents. Without sound background in the uses and limitations of diet in fostering health and preventing illness, the Nation's physicians will be poorly equipped to advise and guide their patients.

I want to take this opportunity to thank the witnesses who have given so generously of their time to be with us this morning so that the Senate will be better informed about this important issue.

At this time I recognize Senator Dole from Kansas, the ranking minority member of the Senate Agriculture Committee for any comments that he might like to make.

STATEMENT OF HON. BOB DOLE, A U.S. SENATOR FROM KANSAS

Senator DOLE. I ask that my entire statement be made a part of the record.* Since you covered the highlights, and we are in the process of marking up the tax bill, which affects all the witnesses, I will have to leave soon.

I do not want to take their time reading my statement, except to indicate that we have more and more discussion in the Senate about the rising cost of health care. We have this health plan, or that health plan. We also have the argument that if we had more nutrition education we could approach it in that direction. And finally, we do not have adequate training in medical schools. That is one of the problems. We have all kinds of reasons given for that: Lack of time, lack of competent professionals to teach nutrition, and lack of funds, and lack of several other things.

So perhaps we could find out this morning from the expert witnesses how we should address the problem? Whether there can be any improvement in this area? Whether or not this or that is the practical approach suggested?

Nutrition and health, of course, are related. Whether or not we can reduce potential escalating medical costs—they are going to reach about $200 billion by 1980.

I think these are nuts and bolts hearings. We are trying to find out what we can do, if anything; what we should do, if anything.

Senator BELLMON. Thank you, Senator Dole.

I might say to our witnesses that this is a busy time, but other Members will be dropping in from time to time.

Senator McGovern, who is out of the city, will be here as soon as his plane lands and he can make the trip from the airport.

Our first panel of witnesses are three distinguished professors, Dr. Aaron Altschul, professor and head, Division of Nutrition, Department of Community and Family Medicine, Georgetown Medical School; Dr. Charles Butterworth, professor and chairman, Department of Nutrition Sciences, University of Alabama, Birmingham, Ala.; and Dr. Robert B. Wilson, professor and chairman, Department of Veterinary Microbiology and Pathology, Washington State University, Pullman, Wash.

If you gentlemen will please come to the witness table, we have about three panels in about 3 hours, so I would suggest that we try to make whatever statements you care to make, and that we conclude your testimony in the time limit provided us.

---

*See p. 49 for the prepared statement of Senator Dole.

Which of you prefer to lead off?

STATEMENTS OF PANEL CONSISTING OF DR. AARON M. ALTSCHUL, PROFESSOR AND HEAD, DIVISION OF NUTRITION, DEPARTMENT OF COMMUNITY AND FAMILY MEDICINE, GEORGETOWN UNIVERSITY MEDICAL SCHOOL; DR. CHARLES E. BUTTERWORTH, PROFESSOR AND CHAIRMAN, DEPARTMENT OF NUTRITION SCIENCES, UNIVERSITY OF ALABAMA, BIRMINGHAM, ALA.; AND DR. ROBERT B. WILSON, PROFESSOR AND CHAIRMAN, DEPARTMENT OF VETERINARY MICROBIOLOGY AND PATHOLOGY, WASHINGTON STATE UNIVERSITY, PULLMAN, WASH.

Dr. ALTSCHUL. I think I am listed first, Mr. Chairman.

I am Aaron Altschul, and I thank you for inviting me to testify.*

Surely, there is no question in my mind that nutrition needs to become a formal and established part of the medical school curriculum. There is almost everywhere a little nutrition here and there. We are talking about formalizing it.

I am concerned, however, that both the fullness and the qualifications of the meaning of nutrition education be explored and understood at the outset, that the term "nutrition education" not develop an aura beyond that which it can deliver, or that the term be restricted only to portions of what can properly be considered the province of nutrition education.

The word that I am concentrating on is "relevance." It will be necessary for me, and perhaps others, to discuss a little bit about what we mean by the word nutrition education as part of our testimony.

I would like to tell you first of my personal commitment to nutrition education in a medical school. In cooperation with Prof. William Horner, chairman of the Department of Biochemistry, and with the help of others on the faculty, we have been offering formal instruction in nutrition to medical students of Georgetown University since 1971.

Mr. Chairman, I think it is worth pointing out that whenever you introduce something new in a medical school there is partly a political process involved, among other things. It was providential that Dr. Horner and I were able to find mutual respect, and that we were able to develop jointly a concept of nutrition education that we could both support.

There is no vacuum in a medical school. Any new curriculum must fight its way in, and at the expense of hours given to another subject. That is what happened at Georgetown.

Now, we do have a formal program. It includes a series of lectures to the entire freshman class, electives, and special programs. We also offer refresher courses to practicing physicians.

We consider practicing physicians as part of a program of nutrition education in a medical school; regardless of whether they have had formal nutrition in their curriculum or not, they ought to have the opportunity to pick up new material, or amplify or broaden their knowledge.

---

* See p. 50 for the prepared statement of Dr. Altschul.

We engage in research, and one of the points of the research program is to improve our ability to teach in the medical school.

Our program has been growing, it has a high visibility within the school, keeps adding hours every year, and we are looking to improve it and extend it constantly. Our major concern is relevance. It is not enough that the material be well selected and presented, and one always wants to improve that, but the student must also be shown how the information is best applied. It is not only that there is no extra time in the curriculum, but the students are pragmatic, and they are pretty much pushed for time; they must be convinced that there is something in this new subject that is going to help them in their future practice, otherwise they are going to lose interest.

Hence, a guarantee of proper application does not simply follow increased exposure to nutrition information. It is actually a more complex question.

What you are really interested in is how the physicians can intervene in the health of their patients better by knowing nutrition; that is a twofold question: (1) How can an improvement in their prevailing knowledge help them, and (2) how can we improve the means of applying the knowledge. It is a question of both knowledge and application. Maybe we imply this duality as we talk about nutrition education, but I think we ought to be more explicit; this is the purpose of what follows.

There are two aspects to nutrition in the United States. Both have their roots in the same physiology and biochemistry, but they deal with the problem of optimum nutrition as approached from two directions.

The first is nutrition under conditions of relative scarcity. This is the history of nutrition from the beginning of man. This is the prevailing problem in the world. And this is classical nutrition.

The second, which I call affluent society malnutrition, is nutrition under conditions of relative abundance. There is more than enough to eat. The trick is how to manage prevailing food supply properly for best health. This part of nutrition is the major preoccupation of the so-called industrialized societies, and a major preoccupation in the United States.

I do not want to minimize the notion that there are no problems of not having enough, and Dr. Butterworth is going to show elegantly some of those problems.

Poor people have both types of problems. We find in poor people problems of not having enough, and yet, at the same time, the major nutritional problem of adult black women, for example, is obesity.

What I have been saying is summarized in the slide. Income is increasing to the right; enjoyment of eating is the solid line; nutrition status is the dotted line.

As income increases, more money is spent on eating, not because of the desire to eat better in the sense of nutrition, but because each individual seeks more enjoyment in food and more convenience.

As more money is spent on nutrition, things get better at first. That is region I. Theoretically, one ought to get to region II and stay there.

But the facts are that in our society, as people have money to spend on food, nutritional status starts going down again. This comes from overconsumption, and brings a new set of problems. This is region III.

There are two alternatives: Returning to the simpler life, as in II, or to figure out new ways of adjusting lifestyle to solve these problems, as in region IV.

When the problem is that of not having enough, that includes clinical treatment of deficiency diseases, intervention could be by providing more money, that is a nutritional intervention. Food stamps are a nutritional intervention; school lunch, feeding programs for the elderly, feeding programs in institutions, fortification of foods and micronutrient supplementation are nutritional interventions. It is not unlike the model of animal feeding, where there is complete control over the diet. All that needs be done is to add more.

In a sense, that is an easy thing to conceive. I do not want to be misinterpreted. It may be impossible to do in a poor country, if there are not the resources. But, intellectually, it is easy to conceive of possible successful interventions.

Nutritional problems under conditions of abundance, which would be region III, are complex, both in the nature of the knowledge base and in the means for intervention. Diseases that are exacerbated under conditions of abundance, such as diabetes, hypertension, and arteriosclerosis, have a complex etiology which involves an interaction of heredity and the environment to which the individual is subjected.

The person's environment, and the environment is complex, it is not just nutrition. It includes exercise patterns, smoking, blood pressure; it includes other lifestyle conditions. Obesity, which is a factor in adult-onset diseases, is itself a complexity of heredity, environment, and socioeconomic conditions.

The nature of evidence where the problem is scarcity is clear. When conditions favor scurvy, addition of vitamin C to the environment eliminates those conditions. You observe an almost miraculous result, a clear cause and effect.

When you are dealing with problems of the complexity of adult-onset diseases, it is not easy to develop a clear cause and effect relationship. Instead there are a group of factors, the risk factors. In such a situation we have problems with the student who requires hard evidence, and is somewhat disappointed with the large area of gray in the information base. Yet, as a physician, this same person has to face these problems and deal with them in the light of incomplete information.

An intervention by the physician in that area is complex. It is questionable whether the physician community alone, or any single segment of society alone can do the job. It is a total societal problem, a holistic treatment is needed that requires creative interaction between all of the disciplines. The physician needs to know how this interaction goes about.

If the physician does not understand, he can offer unrealistic advice, and, for example, give the patient a piece of paper and say, "Here is your diet." He can do this without understanding that diet is part of a larger problem, that people do not just eat diets, they eat foods, and they eat foods because of certain cultural factors which must be understood. Or the physician may withdraw, which I think is just as bad, and you have a proliferation instead of lay treatment, of less qualified people going into the vacuum and telling others what to do.

I view the field of preventive medicine as the area of greatest challenge and opportunity for nutrition in the United States. Therefore, I would hope that nutrition education would include within its objective the presentation of both the knowledge base and the state of intervention regarding nutritional problems under conditions of abundance—that is where I think the action is—with continual reevaluation of the role of the physician as the knowledge improves and experience in intervention progresses.

The student must know the opportunities and limitations of nutrition in this area, and the student must have a realistic notion of what can and what cannot be known or done.

There is no room for an exaggerated view of what nutrition can do. It is this exaggeration of the virtues of nutrition that has led to unprecedented faddism, to self-medication, and the proliferation of the widest variety of diets to cure almost every ill.

It is a cruel deception to practice on sufferers from disease. I would hope that more resources would be made available for nutrition education in medical schools. But I would like to emphasize and urge that such programs include pilot tests of the education process. Too often we are prone to run into an area; it is exciting; it looks good; nutrition education, for example. There is no one against nutrition education, but we ought to know from the outset what have we achieved when we introduce more such programs. We ought to determine the best subjects to concentrate on, which seem to show the greatest effect on the physician's later practice.

So, as we support the general idea, we should seek dynamic curriculum development and provide for feedback to insure the best relationship between what we teach, and what the physician does with the information. This would include, I would emphasize, the creation and the study of teaching models.

I would conclude by saying that we have not exhausted, by any means, the limit of present knowledge of nutrition in terms of what can be done for the health of the population. But the knowledge of the best ways to intervene, as related to the present society and its problems, is not generally worked out, and needs developing to take full advantage of the existing knowledge base.

Thank you, Mr. Chairman.

Senator BELLMON. Thank you, Dr. Altschul. We will have some questions for you, but I believe we will hear from the other panelists before we start the questions.

So, we will proceed with Dr. Butterworth?

Dr. BUTTERWORTH. Thank you very much, Senator Bellmon, Senator Dole, ladies and gentlemen.

I am Dr. C. E. Butterworth, Jr., professor and chairman of the Department of Nutrition and Sciences at the University of Alabama in Birmingham.*

---

* See p. 53 for the prepared statement of Dr. Butterworth and pp. 54–63 for the article referred to on p. 7.

It is a great privilege to have the opportunity to speak to you about two topics which concern me very deeply: Hospital malnutrition and nutrition education.

I beg your indulgence in asking that you allow me to speak as an individual physician and teacher, and not as a spokesman for any group, the principal reason being that the subject is somewhat sensitive, and seems to be critical. The intent is not to be critical, but to be constructive, and my main purpose is to describe to you my view of the situation, and give some statistical, as well as specific individual anecdotal examples of problems so that you will be aware of the situation and the dimensions of the problem.

I have submitted for inclusion in the record a detailed article that was prepared with some of my colleagues, Dr. Roland Weinsier, Mrs. Edie Hunker, and Dr. Carlos Krumdiek, and invite you to peruse this at your leisure.

This is scheduled to be published in the American Journal of Clinical Nutrition in the future. As far as I know, it is the only prospective study of hospitalized patients. Previous studies have examined nutritional status at only one point in time.

To summarize this work very briefly, we examined eight indicators of nutrition status in 134 consecutive patients at the time of admission to the hospital for a medical illness, and after they had been in the hospital 2 weeks or longer we repeated the assessment at frequent intervals. The gist of the study was that there was a clear pattern of deterioration in nutrition status among six of eight indicators of nutrition status during the hospitalization.

We would like to think that nutrition status would remain the same or improve when a patient is in the hospital, or under a physician's care. But one of the more significant aspects of the study was the observation that patients who came in the hospital for normal tests, deteriorated also, and three-fourths of the patients admitted with a normal test, had an abnormal result at the time of discharge, transfer or death.

To make a sort of crude analogy, this is like puting your car in the shop for one thing, and having to leave with more problems, or different problems than you put it in with.

One of the incidents in the study was surprising. We found that 5, among 108 subjects tested, had unrecognized or incipient scurvy. They had a blood level of vitamin C that was decidedly in the deficient range, and there was therefore a risk of problems related to scurvy. But the most serious problem encountered was protein-calorie malnutrition, (PCM). This disorder is life-threatening, because it is associated with poor wound healing and increased susceptibility to infections.

There is now widespread agreement that PCM occurs in 25 to 50 percent of all patients hospitalized for longer than 2 weeks. There can be no doubt that protein-calorie malnutrition or PCM, as it is known, increases the rate of complications and prolongs the hospital stay. No one knows how much of this is preventable or treatable, but I would guess at least half of it is treatable.

Now, according to the American Hospital Association, the latest figures that I find, there were approximately 36 million admissions to U.S. hospitals in 1976. I estimate that approximately 2 million of these—this is a very conservative estimate—at least 2 million of these suffered from hospital malnutrition, and that much of this was unrecognized, or inadequately treated. Time does not permit a detailed analysis of the many causes of the present deplorable situation, but I would like to suggest that much greater emphasis is needed on nutrition education in schools of medicine, dentistry, and allied health.

It is a problem that affects health care at many levels, but particularly physicians. There is also a need for improvement in diagnostic methodology and the system of delivering nutrition support services.

With current total expenditures for hospital care running above $60 billion annually, it is clear that even a small improvement in duration of hospital stay, complications, and so forth and so on, could bring about enormous savings, prevent these complications, and shorten the hospital stay. In fact, conceivably some of these admissions could be prevented altogether.

Now, in the remaining few minutes, I would like to present a few slides that show specific examples of some problems that we have encountered.

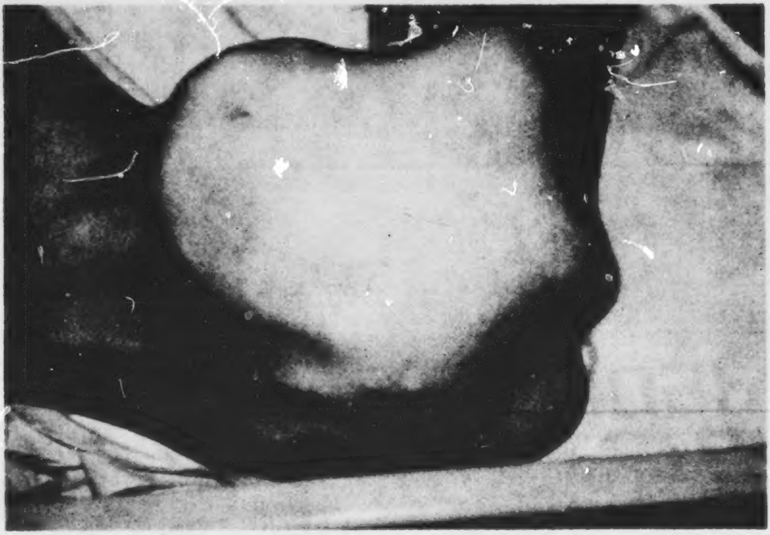
This is the appearance of a 19-year-old male who was admitted to a hospital following a motorcycle injury. This picture was taken 26 days after the injury, a depressed skull fracture. By that time he had lost 45 pounds of weight from an admission weight of 130 pounds, down to 85.

The next slide. If you only look at the two lefthand columns, these are the dates, and they show that his weight pre-injury was 130 pounds, he fell to 85 pounds in 26 days, and deteriorated a little bit further, but when a feeding program was instituted he regained much of that.

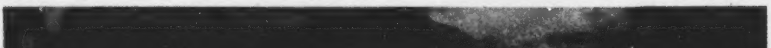
GWG 19 M
Height 5'7"
Adm: 5-3-76

	Weight	TSF	MAC	TSP/ALB
(Standard)	(130)	(12.5)	(29.3)	(6/3.5)
5-03-76				7.5/4.3
5-29-76	85	2.5	19.5	7.8/2.7
6-04-76	82			7.0/2.3
6-11-76		2.5	19.5	7.4/2.5
6-23-76	80			
7-01-76	84	2.0	18.5	
7-09-76		3.0	18.5	
7-12-76	85			
7-19-76	89			7.0/3.0
8-03-76	94			7.3/3.5
8-09-76	101	5.0	22.5	
9-23-76	114	9.0	24.0	

The next slide. This is the appearance of his buttocks, and sacral area, and it shows the beginning of bed sores.



Next slide. This is taken about 4 weeks later.



The next slide. This is taken about 8 weeks later, and it illustrates the rehabilitation.

One of the points of this case is that during the period of severe protein-calorie malnutrition, he was at great risk of acquiring an infectious disease of some organ or tissue, and conceivably dying of it. Paradoxically if he had died of such an infection it is unlikely that malnutrition would have received any of the blame.

Senator BELLMON. Doctor, before you go to the other slides, in a case like this, is it injuries that caused his physical condition to deteriorate, or strictly a matter of malnutrition?

Dr. BUTTERWORTH. In this case it was a head injury, and it interfered with his ability to swallow. But there are methods of getting around this with intravenous feeding, which he did not receive.

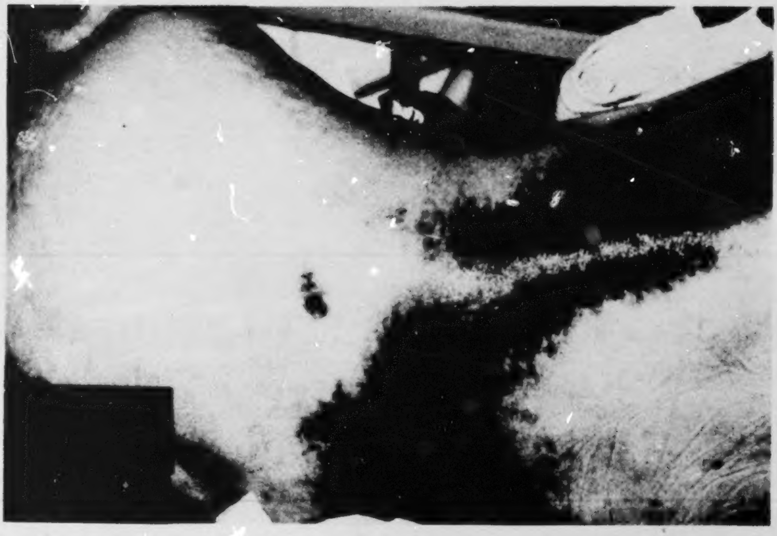
Senator BELLMON. So your contention is that the change in his diet caused his physical condition to improve, rather than the fact that his head injury was——

Dr. BUTTERWORTH. I think aggressive identification of his problem, and early management could have headed off much of his weight loss, and eliminated part of the risk that he had.

This is a patient recovering from a burn, and it illustrates a common practice of tube-feeding with a makeshift apparatus. This is a glucose bottle that is being reutilized for tube-feeding. It has been opened up in the contaminated environment of the hospital, and subjected to contamination of bacteria that floats in the air.

We cultured this liquid formula and found that it was heavily contaminated with disease bacteria.

Shortly after this picture was taken the patient gagged, aspirated, and developed pneumonia, due to the organism that was present in the tube-feeding. The management of the burn had to be temporarily deferred, and her hospitalization was prolonged.



This is a case of receiving nutrition support under less than desirable conditions. I suspect this is not uncommon in many hospitals around the country, and in this case it resulted in unduly prolonged hospitalization.

Senator BELLMON. Are those feeding solutions prepared in the hospital, or are they commercial?

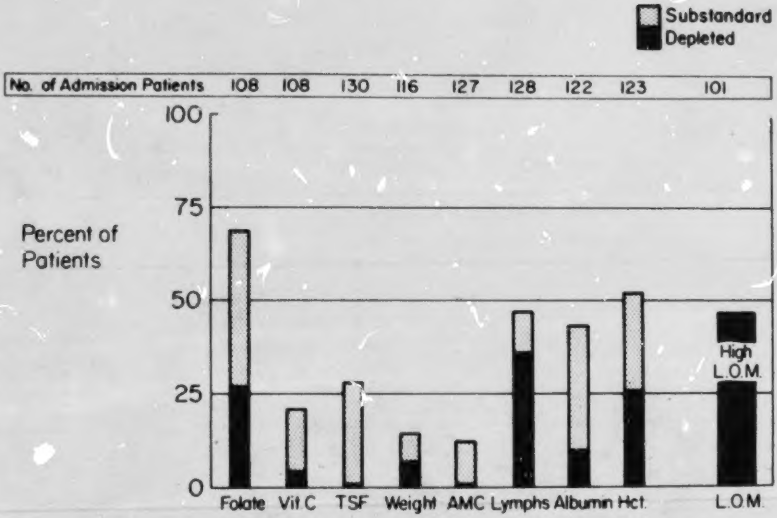
Dr. BUTTERWORTH. Most of them are prepared commercially, and are received at the bedside in sterile condition. But when they are allowed to hang at the bedside at room temperature, or hot days, for 8, 10, or 12 hours, they are subjected to contamination after they are manufactured.

Senator BELLMON. So your point then is not that there is carelessness of the manufacturer?

Dr. BUTTERWORTH. No; this is a 65-year-old patient who was admitted to the hospital for an elective operation for recurrent cancer. We were asked to see her the day following the operation, at which there had been multiple transfusions required, and at the bedside, a moment's glance shows that she had no teeth. We asked about her diet, and it appeared that she had lived alone, had consumed only highly cooked soft foods, and had no fruit juice, fresh vegetables, or raw vegetables, or fresh fruit for many months. We drew a blood sample, and found that the serum level of vitamin C was in the range of scurvy. In short, she had unrecognized scurvy.

The next slide. This picture illustrates the hemorrhage which is common to scurvy. This illustrates the dissection of blood from the abdominal cavity into the flanks. Unfortunately, this patient died 10 days later, and we will not be able to know if she might have recovered from her cancer. Paradoxically, the death certificate did not mention scurvy or cancer.

Now, this is the tabulation of the statistical study of patients that we saw entering the hospital. This is the aggregate of 134 consecutive patients. We were not able to get all tests on all patients.



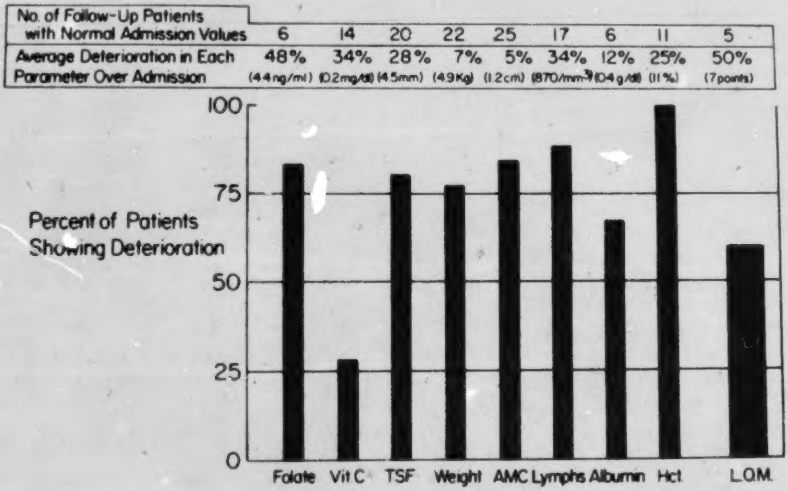
Reading along the bottom, the indicators are shown. First, folic acid, then vitamin C, then triceps skin fold, weight, and so on. The solid area at the bottom represents those patients who had deficient level.

We arbitrarily put the results into a weighted mean to provide an overall index of malnutrition. We estimated that half of the patients were at risk, or had manifestations of malnutrition.

The next slide illustrates that there was deterioration in six out of eight tests.

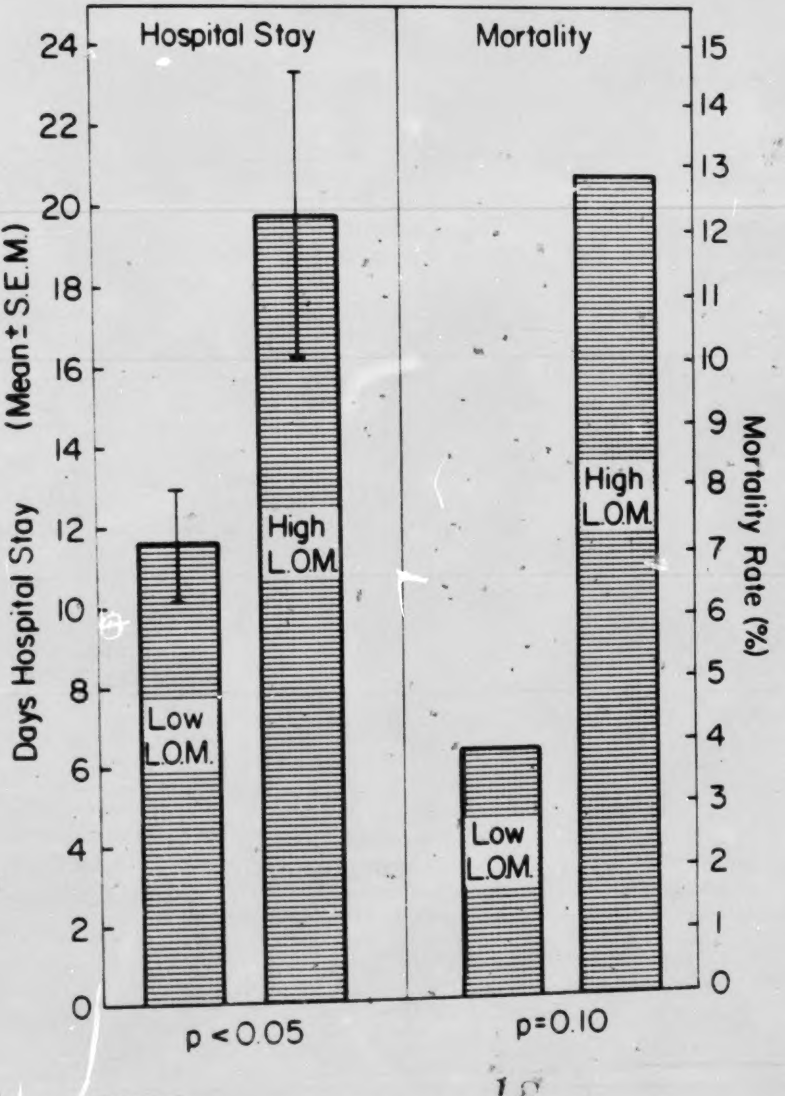
Is there one other slide? Yes.

This is the slide which tabulates only the patients who were normal at the time of admission. The height of the column indicates the per-



centage of patients that were abnormal for that parameter at follow-up. It shows that 75 percent of the patients with a normal test on admission, became abnormal during the hospitalization. The next-to-the-last column on the right shows that 100 percent of the patients became anemic, and this is no doubt attributable to the amount of blood that is drawn for routine laboratory tests.

The last slide. We attempted to evaluate the effect of the malnutrition indexes on the duration of hospital stay. Those with the worst indexes have the longest hospital stay. Admittedly, this could be due to the fact that they had a more serious illness. We merely point this finding out, and call it to your attention.



We will not know if nutrition intervention might have helped it until we are able to carry out nutrition intervention in a comparable series.

We also noticed that the ones with the worst malnutrition had high mortality rate, but the same comment might apply, and the statistics do not permit firm conclusions, because the numbers are small.

May I have the lights, please?

Senator **Bellmon**. Concerning the patient who was diagnosed as having scurvy, and who later died—is this an indication that the physician made an error, to operate under those conditions?

Dr. **Butterworth**. As I indicated, it is difficult to be critical, and I would like to avoid being critical of any one individual. I think there are many points in the system that were at fault. I think we could criticize nurses, dietitians, laboratory people, for not picking up this problem, but it is very clear that——

Senator **Bellmon**. My point is, with better nutrition education, perhaps the physician would not make those mistakes, if in fact this was a mistake.

Dr. **Butterworth**. Absolutely. I think the physician would have wanted to have his staff of supporting personnel to detect this as part of the screening and preparation of surgery, to avoid this type of error.

Senator **Bellmon**. Do you feel these types of errors are common, or unusual?

Dr. **Butterworth**. I would not want to say common. I think they are prevelant in the country.

I would like to emphasize that the sorts of things that I have described occur nationwide, are published in reports from many parts of the country, and even a report from England, which suggests that a similar situation prevails in England, and to my knowledge it exists in many parts of this country.

A comprehensive study has never been done. I think one should be done to determine the extent of the problem. I admit that these are perhaps striking and dramatic examples, but I think they underscore the nature of the problem.

To conclude, I do emphasize that this is a national problem. I think it may affect as many as 2 million or more persons annually, and I think there is an urgent need for improved nutrition education for health professions at all levels.

I think this would constitute an essential first step in the long-range solution to the problem. It involves not just physician education, but many levels of many echelons of people involved in health care delivery.

I believe that Federal expenditures would be cost effective by reducing the length of hospital stay, and in some cases, perhaps by eliminating entirely the need for costly hospitalization.

Thank you very much, Mr. Chairman.

Senator **Bellmon**. Thank you very much, Dr. Butterworth.

Doctor Wilson will be our next panelist.*

Dr. **Wilson**. Thank you, Senator Bellmon, gentlemen.

---

* See p. 63 for the prepared statement of Dr. Wilson.

I bring you greetings from Pullman, Wash., which is not the end of the world, but you can see the end of the world from there.

During this presentation, I would like to emphasize five points.

First of all, animal products will be of an ever-increasing importance in providing food to people. Second, I would like to talk about the critical role of the veterinarian in maintaining the supply of food for people.

Third, that nutritional diseases and related diseases are important in animal production.

Fourth, I would like to review the state of nutritional education in veterinary schools at this time, and make some comparisons of education in schools of human medicine, and finally, make some recommendations for the committee.

The Nation's 33,000 veterinarians currently play a key role in maintaining our ability to provide food for our ever-increasing population.

In addition to protecting the health and productivity of our livestock industry, veterinarians care for the Nation's companion animals, and contribute to the understanding and control of human disease through comparative biomedical research. Every medical school has one or more veterinarians engaged in research activities.

As Chairman Bellmon is aware of, the most acute food shortage in this country and abroad is of the protein foods, especially those of animal origin. The "green revolution" has made remarkable strides in increasing world protein production, but it is now clear that plant production alone will not meet the protein needs of the world's increasing population.

Land for direct food crop production is limited to approximately 10 percent, and since we have already taken advantage of mechanization and fertilizers, which were based on cheap energy, the yield of cereal grains is not likely to increase as rapidly in the future as it has in the past.

The most important point perhaps to make here is that animals in general, and ruminants in particular, such as cattle and sheep, will be important sources of food for people in the future, because half of the Earth's land area is unsuitable for crop production, but highly suitable for grazing animals. In other words, these animals are able to eat foods that are unsuitable, or even unusable for people.

However, to take full advantage of the potential of livestock to meet the nutritional needs of the world, a number of objectives must be accomplished. Chief among these are controlling animal diseases, breeding for disease resistance in animals, as has been done so successfully in plants, overcoming malnutrition in animals, and improving methods of production.

In the United States, diseases and parasites decrease animal productivity by an estimated 10 percent. In many countries of the world, however, these losses exceed 50 percent. It is estimated that at least 100 million additional cattle could be grazed in Africa if a single disease, trypanasomiasis, could be eliminated, just to give an indication.

Senator **Bellmon**. Which disease?

Dr. **Wilson**. Trypanasomiasis. If that one disease could be overcome, it would open up the largest bank of land anywhere in the world. It would make a significant difference to agriculture.

20

The United States has virtually eradicated eight important animal diseases in the last 100 years, but the total/losses of disease from parasites is estimated to be over $4 billion a year, which points up to the need for continued increased research efforts.

Now, just as animal products are important for nutrition, which should also point out the obvious, which is important, that animals themselves have a benefit of proper nutrition in order to insure economical production, optimal health and, in the case of companion animals, long lives.

Veterinarians, therefore, must have a working knowledge of nutritional principles for a variety of species, and in this sense, their obligation is a little more difficult than physicians who worry about a single species. Animals, like people, are affected with many nutritional and metabolic diseases, including protein, mineral and vitamin deficiencies, starvation, and obesity.

Although these conditions are important in their own right, perhaps even more important is the interaction of nutritional state and other diseases. For example, as has been mentioned already, protein-deficient animals are more susceptible to a variety of infectious agents than are adequately fed animals.

We know from working with animal models, that carcinogens and toxins vary considerably in their effect on animals, depending on the nutritional state of the animal.

Livestock and pet owners require persons, other than veterinarians, who possess information and expertise pertaining to animal nutrition. Nutritionists at the Ph. D. level in universities, cooperative extension services, and the feed manufacturing industry play a vital role.

However, this does not, and cannot relieve the veterinarian of the responsibility to have at least a basic knowledge of the principles of nutrition, just as the physician is expected to have more than the layman's understanding of human nutrition.

We have a problem here, though, that affects veterinarians, and that is that traditionally, a veterinary educational program is designed to qualify the student to make accurate diagnosis, and to institute appropriate treatment. Veterinarians have developed justifiable pride in these capabilities.

The traditional veterinarian is likely to feel more rewarded by the diagnosis and treatment of hypocalcemia in a dairy cow than by the outline of a program for dairymen that would reduce the number of hypocalcemic cows to be treated. Something in our psychological makeup lets us enjoy the role of the old family doctor who is always on hand to help out in an emergency, but we seem to find less satisfaction in preventing problems. This is ironic, because livestock producers often cannot afford the services of a veterinarian to deal with a single case, but many producers realize that money spent for preventive programs, including nutritional consultation, is cost effective.

Nutrition education is being provided to veterinary students and to graduate veterinarians in a variety of ways. In a recent survey, we found that colleges of veterinary medicine in the United States are about equally divided in their approaches to nutritional education. Approximately one-third require a course in nutrition during the preveterinary curriculum; one-third offer a distinct course in nutritional curriculum in the professional curriculum; and about one-third utilize an integrated approach by teaching nutrition within the framework of established courses in psychology, pathology, and medicine. At least three colleges now have clinical nutritionists on their faculties, and others seem to be moving in that direction. The desirability of having such a position on the faculty was often expressed by representatives of several of the schools, as was the need for inservice or continuing education programs in nutrition for the faculty.

At Washington State University, we found a number of the faculty are convinced of the inadequacy of nutrition education in the veterinary curriculum. However, opinions differed markedly on what should be done to correct the deficiencies, or the extent to which veterinarians should be educated in matters relating to nutrition.

Some feel that their education ought to be limited to feeds and feeding approach. Others think that they ought to have an indepth education with respect to physiological biochemistry.

I found students at Washington State and Missouri, to be highly motivated with respect to their desire to learn about nutrition. However, students seem more interested in receiving this education through a case-oriented approach, rather than in separate didactic courses on nutrition.

Most schools have found that veterinary students want to learn nutrition from veterinarians, and not from academic nutritionists, even though the latter might be highly qualified. Courses in nutrition taught in the preveterinary or professional curriculum, by nonveterinarians have not usually been successful, partly because of student attitudes, and partly because of the relative lack of understanding of the nonveterinarian, about that total scope of the disease. This also may be a problem in some medical schools.

I believe that the most satisfactory approach to the problem is to have one or more veterinarians, well trained in nutrition, serving as clinical nutritionists in our colleges of veterinary medicine. At least three schools have established such positions, two of them with the assistance of special funding from private sources. These faculty members could not only teach, but also influence course offerings in general, and serve as resource persons to all faculty and students. They would also be well qualified to serve as liaisons between the veterinary faculty and professional nutritionists in other university departments, or in industry.

The significant limitation to such a recommendation, however, is the paucity of trained veterinary nutritionists. Very few individuals have been trained during the past decade, and only a few of these have taken positions in veterinary schools. The establishment of a specific program to train both current and future veterinary faculty in nutrition is critically needed, and I believe the same is true with respect to physicians.

A number of organizations have made some progress in providing continuing education in nutrition for veterinarians during the recent past, but the overall effort is still minimal. Feed manufacturers have offered literature and conferences, and have, to a limited extent, supported research projects. A few papers dealing with nutritionally related subjects are read at the meetings of most major veterinary groups.

At the 1977 Convention of the American Veterinary Medical Association, 17 papers considered some aspect of nutrition. Unfortunately, during the same year, only four abstracts dealing with nutrition were published in the Journal of the American Veterinary Medical Association, and not a single full-length paper on the subject appeared in that Journal in 1977. On the positive side, at least 12 autotutorial programs considering veterinary nutrition are available from various libraries.

Now, if I might, compare somewhat, veterinary and human nutritional education. The provision of adequate education in nutrition is a concern shared by veterinary and human medicine, since nutrition education has been an impoverished area in both professions.

Traditional approaches to medicine in both professions have emphasized curing rather than preventing disease. Using the scalpel and syringe is considered more heroic than prescribing a special dietary regime to prevent disease. In both professions, administrators and faculty sense that something must be done to eliminate the deficiencies in nutrition education, but new faculty positions are scarce, and few training programs exist to retrain current faculty. Students in both professions are generally eager for information concerning nutrition, but they wish this information to be presented in a relevant way, using the practical, case-oriented approach, and both professions experience difficulties in defining the appropriate relationships between physicians and veterinarians in nutrition education, and professional nutritionists and dietitians.

In the past, Mr. Chairman, I think it would be safe to say that veterinarians perhaps had a slight advantage over physicians with respect to their education in nutrition, because many of their courses emphasize nutrition in the preveterinary curriculum.

In recent years, fewer preveterinary students have taken the traditional animal husbandry courses, and some of this advantage has been lost. Medical schools, moreover, seem to be more active than veterinary schools in promoting nutrition education programs, and in establishing programs emphasizing clinical nutrition. A good example is the program at the Boston University School of Medicine.

Finally, most professionals in both disciplines would agree that more must be done to prepare our students to deal with problems related to nutrition, and nutritionally related diseases.

I have listed in my prepared remarks four recommendations, and in the interest of time, I would like to emphasize only two.

First, that training programs should be developed for both veterinarians and physicians at two levels: one level to train present qualified faculty in nutrition; the other level to provide graduate-level training for future veterinary faculty members.

These programs need not be large, but they should be specific and carefully designed to meet the desired goal of providing at least one faculty member in each of the colleges of veterinary medicine with sufficient expertise in nutrition to act as clinical nutritionist in the manner described previously.

Second, there must be increased support for research into animal diseases and problems of production.

Both nutritional problems of animals themselves, and the role of animals and animal products, such as milk and eggs, in the nutrition of man must be studied. Most industries find that it is profitable to designate 5 to 10 percent of gross sales for research. This is 20 to 40 times the amount spent by State and Federal Governments for research on animal diseases.

In most years, almost twice as much is spent for plant disease research as for animal disease research by the U.S. Department of Agriculture, despite the fact that cash receipts from marketing livestock and livestock products usually runs considerably higher than those from plant products. Research efforts into diseases of plants ought to continue, but the great disparity in funding at the Federal level should not exist.

If I could have quickly just the slides again, to emphasize one or two points.

Mr. Chairman, I think in the interest of time we will not show these slides.

Senator Bellmon. Thank you very much.

I again want to express the appreciation of the committee for your coming to testify.

Let me start with Dr. Altschul, Senator Leahy is here now, he may wish to ask some questions, and at any time, Senator, feel free to break in.

In your testimony, Doctor, you mentioned the fact that at Georgetown you offer refresher courses to practicing physicians.

Could you go into a little more detail about this refresher course? How long does it take for a physician to go through the course? What kind of training does the physician get?

Dr. Altschul. We are experimenting, ourselves, on what would be the most efficient way of doing just that. We offer a 1-day discussion of special topics in nutrition.

Senator Bellmon. One day?

Dr. Altschul. One day, in which we work to hit the highlights of the problems that we think ought to be dealt with.

In the last course that we gave, we dealt with the problems of obesity, with the problems of dealing with diabetes and arteriosclerosis, and with some of the questions in nutrition that the physician has to answer more often.

Senator Bellmon. I think of the 2 years that I struggled with nutrition courses in college. It makes me feel like an expert.

Dr. Altschul. You are not starting at point zero. All physicians are exposed to nutrition to some degree. You can do much to stimulate them, and show them where they can get more information. That is about the most time that you can get from them at one time. And so there must be a continuing series of these 1-day sessions.

Senator Bellmon. Dr. Wilson, what did you have in mind when you spoke of training those in the profession? Were you thinking of something more elaborate?

Dr. Wilson. Not really, but just hitting them from the various angles. Well written articles, for example, in professional journals. Just reminding them that really what they have been taught at one time, that perhaps has slipped in their memories. Short courses in reading, autotutorial programs, self-instruction programs are becoming very popular, many physicians and veterinarians now subscribe to such services.

I do not know how much nutrition, if any, is taken into the programs in any one way.

Senator BELLMON. Dr. Altschul, where do you get your training materials? Are they prepared in-house, or some institution, or perhaps even a Government agency that is working to make training aids available?

Dr. ALTSCHUL. There is plenty of information around, but we primarily develop it ourselves, to suit our needs.

Senator BELLMON. Is this available to other institutions if they chose to use it?

Dr. ALTSCHUL. It can be. I would like to make one other point.

If you have these programs for physicians on a regular basis, several times a year, there is the beginning of an institutional way of providing physicians the information that they need.

Senator BELLMON. Dr. Wilson, in the veterinary field, is there any source of teaching aid? Where do you get the information you feel that veterinarians should have?

Dr. WILSON. Well, the American Veterinary Medical Association sponsored a nutrition program, and they have some programs that are available, that a practicing veterinarian could check out.

The libraries of the medical schools are the best sources, and most libraries do have various autotutorial programs, and other resources available for the practitioner. I think here is one time that we cannot look down our noses at the industry. The feed industry has done a remarkable job.

Senator BELLMON. As I think the witnesses know, we put some money in the budget for nutrition education. I have the language before me. It is rather long, and I will not read it, but as I remember the language, there is no provision in here for the retraining of practicing professionals. So maybe we have made a mistake here, and perhaps we ought to correct that, if we can.

Do you feel there is any role here for Federal involvement, perhaps a program to prepare materials, or do you feel that your institutions will do that on their own?

Dr. ALTSCHUL. If I may say so, I think a major role is to find out how effective these are. I keep coming back to that point. It is not just that we must expose the physicians, but we must determine what it is that is most useful in their practice. I would encourage pilot programs, coupling education with evaluation to determine what actually happens after the course. This is what is needed and what is not now in existence.

Senator BELLMON. I understand our language is broad enough to allow the monitoring, and hopefully the establishment of pilot programs in this area.

Senator Leahy?

Senator LEAHY. I am concerned in this area. I joined with Senator Bellmon in seeking additional education for physicians in training. Senator Bellmon and I held hearings before on nutrition in Oklahoma, Vermont, and here in Washington. These hearings have led me to the conclusion that the overwhelming majority of medical schools in the United States require no real training of physicians in nutrition.

Even though food nutrition is a factor in things like heart disease, stroke, cancer, diabetes, and so on. I know that most doctors, and if you ask them specifically, will state that they have not had adequate education in the area of nutrition.

It appears to be much the same way in training nurses or paramedics. In fact, I have asked a number of medical schools how much time is spent on teaching the intricacies of malpractice insurance and malpractice litigation, and how much time is spent on nutrition education. Every one of the schools that I have asked, I do not want to embarrass them by going down through them, but they have told me that far more time is spent either directly or indirectly discussing malpractice insurance, than is spent on nutrition education.

I am not suggesting that protection against malpractice is not important. Of course it is, but I like to think, as a receiver of medical services, that at least equal time is being given to nutrition education.

So many times physicians are going to face problems relating to nutrition, or they are going to see situations where problems could be avoided in the future, which bear direct relationship with the type of nutrition education that they can give their patients.

I think we have made a bad mistake in this area, in the way the training schedules are set up in most nurses schools, and others of the like. I know that one medical school which was connected to a hospital, found out that the chief dietitian had available to him or her for a 1-week or 2-week conference each year, and that was really the extent of nutrition education.

Now, I mention it for what it is worth. I do not mention it to denigrate medical schools, but to let you know that there are a number of us here who want to help. There is a growing feeling, certainly since the dietary goals publication came out, that far more has to be done.

If anyone wants to respond.

Dr. ALTSCHUL. I wonder if I might comment?

First of all, the kind of malnutrition described by Dr. Butterworth is dreadful, and truly a matter of ignorance. It has to be taken care of. But you are dealing with broader questions.

Let me give you an example of the problems. I have been interested in the role of salt in blood pressure and hypertension, I have discussed that issue with my colleagues in the medical school, the relation of salt and hypertension has not been taught in a serious way. We are teaching it now. But many physicians are much more comfortable with the notion of providing medication. That is very specific, it is dramatic, it does not require, at least they think it does not require, a serious lifestyle change.

So you see, we have the very fundamental issue that many of the nutritional interventions are nondramatic, they are long term, they require a change in lifestyle. The physician and the patient like it to be dramatic: here is a pill, your blood pressure goes down tomorrow or the next day. This is one of the major problems of dealing with the roll of nutrition in a medical curriculum, particularly as it relates to preventive medicine.

Senator LEAHY. I agree with you, perhaps it is only working because we are paying the pharmacist's bill, and the doctor's bill, and everything else, which raises other questions.

I would like to think there is a lot more that we can do at home.

I know, Dr. Butterworth, you cite the nutrition indexes deteriorating during hospitalization. Twenty-five to fifty percent of all patients are hospitalized for longer than 2 weeks.

Am I right that this country has a major malnutrition problem in hospitals, and if so, what do we do to correct that situation?

Dr. **Butterworth.** I would agree that we do have a major problem of malnutrition in the hospital population for those that stay longer than 2 weeks. I think we must put in that qualification.

I certainly agree with both of my fellow panelists as to what the problems are, we need to reeducate physicians, and point out the relevance of nutrition.

One of the important concepts that I think we must get across to our physicians and medical students is that nutrition is not something that is a remote problem, in a remote area around the world, but that there are very real problems right with us today in our hospitals, and in our clinics, and in our doctors' offices, and that there is something that could be done for them.

I think it is important. We are always taught that we should treat what is treatable, and we need to identify what is treatable. It is a terrible error in the practice of medicine to overlook something that is treatable, and certainly we think that we have a lot of information in the nutrition field that can be applied. It is my opinion that it is not being applied. It could be applied very dramatically and very effectively in patient care, and this would generally raise the level of consciousness and importance of it in the minds of medical students and physicians.

We do need your help in training programs, in organizing departments, in organizing staffs. Our medical students are like children, in the sense that they learn by doing what they see others do. If they have no role models they will not develop them.

I think it is crucial to support nutrition units in hospitals, and medical schools around the country.

Senator **Leahy.** I yield back to Senator Bellmon.

I hope that we can show the same kind of perseverance here as you did in the University of Alabama Medical School. I understand there are only one or two departments of nutrition that exist today. I compliment you for that.

Please preach the gospel everywhere you can, all of you who feel that way, and we will do our best here. None of us are spending money just for the sake of spending money. It is certainly an area that is worthy to take money away from other areas to put into this area.

Senator **Bellmon.** Let me make this comment to all panelists. We have many questions which I would like to ask, and I am sure Senator Leahy has them also.

Would the panelists be willing to respond to them in writing? We have other witnesses who we would like to hear. The only comment I would like to make in conclusion, Dr. Butterworth, is that I think you raise a very valid point in your observation that we need to include all health professionals in the training program, and I hope that we will be able to meet that need.

Gentlemen, thank you very much.

Senator **Leahy.** My wife is a nurse, and she concurs completely in the great lack of nutritional education.

Senator BELLMON. Our next panel is comprised of John Sandson, M.D., dean, School of Medicine, Boston University, Boston, Mass.; Dr. Eleanor A. Young, associate professor, Division of Human Nutrition, University of Texas; Dr. Jack Metcoff, M.D., George Lynn Cross, research professor, Department of Pediatrics, Biochemistry, and Molecular Biology, University of Oklahoma, Oklahoma City, Okla.; and Mr. Jack Rutledge, medical student, Duke University Medical School, Durham, N.C.

Gentlemen, will you take your places here at the witness table, please?

As we said to the other panelists, we have 3 hours, and we now used an hour and a half of it, so we would urge you to be as brief as you can.

Our first witness is Dr. Sandson. So you can lead off.

STATEMENTS OF PANEL CONSISTING OF JOHN SANDSON, M.D., DEAN, SCHOOL OF MEDICINE, BOSTON UNIVERSITY, BOSTON, MASS.; ELEANOR A. YOUNG, PH. D., R.D., ASSOCIATE PROFESSOR, DIVISION OF HUMAN NUTRITION, UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER, SAN ANTONIO, TEX.; JACK METCOFF, M.S., M.D., GEORGE LYNN CROSS RESEARCH PROFESSOR, DEPARTMENT OF PEDIATRICS, BIOCHEMISTRY, AND MOLECULAR BIOLOGY, UNIVERSITY OF OKLAHOMA, OKLAHOMA CITY, OKLA.; AND JACK RUTLEDGE, MEDICAL STUDENT, DUKE UNIVERSITY MEDICAL SCHOOL, DURHAM, N.C.

Dr. SANDSON. Thank you, Senator.

I appreciate the opportunity to be able to testify before you.

I am John I. Sandson, professor of medicine and dean at Boston University School of Medicine.*

Nutrition, as you have heard, should be one of the most important subjects taught in medical schools yet, during the past several decades, education in nutrition in medical schools has been inadequate. This was recounted in nine major conferences held on nutrition in 1962.

A repeat conference was held in 1973. Both conferences declared the status of nutrition education inadequate. Yet, most physicians deal every day with patients who have nutritional problems. These patients include the very young, the very old, those with acute illnesses, and those with degenerative diseases.

Nutritional assessment is important in every patient seen by a physician. Most faculty in medical schools would agree that nutrition is an integral aspect of basic medical science and all the clinical disciplines. Despite these observations, the teaching of nutrition in medical schools is not given high priority and, in fact, is done rather poorly.

Why is this so? Why have not medical schools done a better job with education in nutrition?

I think there are some rather obvious observations. Nutrition in most medical schools is not recognized as a separate basic science or clinical discipline. Nutrition is taught by many different academic departments, including, but not limited to, biochemistry, pathology, physiology, medicine, pediatrics, surgery, et cetera.

---

* See p. 67 for the prepared statement of Doctor Sandson.

Each department, if it teaches nutrition at all, teaches it from its own narrow perspective, usually not in a comprehensive way, often very highly focused, and worst of all, with very limited enthusiasm. There are only one or two medical schools that have departments of nutrition.

There are many medical schools that do not have a well-planned and well-taught curriculum in nutrition. About half of the medical schools still do not have a full-time faculty member who is in charge of nutrition education. Such an individual is critical if education in nutrition is going to be well planned, properly delivered, and effectively evaluated.

Unfortunately, in the give-and-take of medical school curriculum planning, without someone in charge, without an advocate, if you will, the curriculum in nutrition may easily fall between the cracks.

The two essential steps needed to establish effective education in nutrition in a medical school are: The designation of a senior faculty person to be responsible for the educational program in nutrition, and secondly, the allotment of adequate time in the curriculum for nutrition.

The director of the program, with a lot of input from faculty from all departments, should plan the curriculum to be taught during both the preclinical and clinical years. The curriculum in the preclinical years can be taught either in a relatively short concentrated block of time, or by the placement of lectures and seminars throughout the year.

During the preclinical years, the student must obtain an understanding of digestion, intestinal absorption, metabolism, nutritional requirements for normal growth and development, undernutrition, overnutrition, and diseases of nutrition. During the clinical years the student must learn more about clinical aspects of diseases of nutrition, the dietary management of metabolic and other diseases, and the nutritional aspects of all clinical disciplines, including medicine, surgery, pediatrics, obstetrics, and psychiatry.

The director obviously cannot do everything by himself, but he should do a considerable amount of the teaching, and see that all of the teaching in the entire curriculum in nutrition is properly coordinated and of the highest quality. In the clinical years the director must be the catalyst to insure that nutrition receives proper emphasis during the various clerkships. The director should participate in key clinical conferences and rounds, and help develop specific rounds and seminars during each clerkship that are oriented especially toward nutrition.

It is also very important that medical students understand the impact of psychosocial factors on patients with certain nutritional problems. These factors can be emphasized during appropriate seminars and experiences in community medicine and sociomedical sciences and special assignments in primary care settings away from the teaching hospital, either in this country or abroad.

We are very proud of the educational program in nutrition at Boston University School of Medicine. I will not go into the details of that program, but suffice it to say that we have teaching going on every year, for 4 years, and have allocated significant amounts of time to nutrition.

Nutrition education in many medical schools has been poor because of lack of interest and/or organization. Effective education in nutrition is needed in every medical school. The curriculum needs to involve both the preclinical and clinical years. There needs to be a senior person in charge. An academic structure in nutrition needs to evolve in each medical school. Different schools will undoubtedly evolve different structures—some will have no formal structure, just a committee, others will develop a section, a division, and perhaps someday, in most medical schools full academic departments may develop.

Some legislative action involving nutritional education may prove to be helpful. Medical schools should certainly be encouraged to have someone in charge of the curriculum in nutrition and perhaps to develop an administrative structure in nutrition. There are various approaches that could be used. For instance, the development of an appropriate program in nutrition could be a condition of capitation. Another approach would be to make the development of a curriculum in nutrition a special project under the health manpower law or under a new law.

The liaison committee on medical education, which accredits all medical schools in this country, could also encourage schools to give more emphasis to education in nutrition.

Lastly, I would like to agree with the remarks that have been made by other panelists about the importance of continuing medical education, and I think legislation could be developed that would encourage medical schools, and other health schools, to develop programs for continuing medical education in nutrition.

I would agree that we still do not know what the best format is, but part of the legislative program that evolved could be to try to determine what the best format is.

Thank you.

Senator BELLMON. Thank you, Dr. Sandson.

We will have some questions, but let us hear from our panelists first.

Dr. Young, you are second on our list.

Let me say that anyone who wishes to summarize his statements should do so. The entire statements will be made a part of the record.

Dr. YOUNG. Senator Bellmon, Senator Leahy, ladies and gentlemen, it is certainly with great appreciation that I have this opportunity of sharing with the Subcommittee on Nutrition our efforts to incorporate nutrition into the medical curriculum at the University of Texas Health Center in San Antonio, Tex.*

I think we all agree that nutrition as a component in the curriculum of most U.S. medical schools has been neglected. Recent studies have shown that nutrition is not a required course in most medical schools, but is left more to chance that it may be incorporated into the experiences of the students.

Most of us are also aware of the recent study by the American Medical Association of 114 U.S. medical schools that indicated that while most schools did incorporate some nutrition into their curriculum, only 19 schools did have a required course.

I have been asked to show the way we have tried to do this at our school.

---

* See p. 69 for the prepared statement of Dr. Young.

If I might have the first slide, please.

In our experiences, I think that medical schools should come to a clear understanding and articulation of nutrition as an essential proponent of health care.

I think there is absolutely no way to prepare students for comprehensive health care delivery without nutrition being an essential component of that delivery. I think the role of the physician, though, in doing this, could be looked at from several perspectives.

First of all, the physician certainly plays a role in preventive medicine. He does this with the application of nutrition knowledge aimed at the prevention of the "killer diseases." Physicians and other health personnel, especially nurses and dietitians, are major forces in preventive medicine. It is likely that without support of the entire medical team, the prevention of disease through nutrition may not be possible.

The physician's potential (for nutrition education) is very great, but this potential seems to be dampened by the fact that there is a lack of knowledge of nutrition by many physicians, certainly by minimal Federal support of nutrition education, and third, by the tremendous opposing force of a great deal of misinformation that reaches millions of Americans by mass media channels.

The physician's role in research is another dimension in which nutrition plays a part in health care. Our understanding of nutrition-related diseases is derived largely from clinical trials and human metabolic studies, to a larger extent carried on by physicians.

So, I think that nutrition research and education, coupled, are perhaps our best means of prevention of disease.

Physicians' responsibilities for the care of the critically ill patient is where nutrition knowledge becomes most crucial, as we already heard from Dr. Butterworth.

Adequate nutritional support for these patients requires a great deal more expertise and knowledge today than it did 15 years ago. This is due largely to the advancements made in total parenteral nutrition, as well as the effective use of enteral defined formual diets.

To provide adequate support for critically ill patients certainly imposes great responsibility, not only upon the physician, but on the entire medical team. Not to make use of nutritional support that could be used has brought us to recognize that the prevalence of iatrogenic malnutrition in the general medical and surgical services, generally runs from 25 to 50 percent of this hospital population in U.S. hospitals.

I think that nutritional support for outpatients is another dimension of the application of nutrition by the physician. To what extent nutrition-related diseases, so-called killer diseases could be prevented, or at least minimized through adequate care for this particular group of patients is really not known.

So this broad perception, as indicated by this diagram, actually forms the basis of our program at San Antonio.

Now, some positive factors that have enhanced our effort, I have tried to pinpoint here, so that I can present this rather quickly.

First of all, I think that recognition and support by both the administration and faculty is absolutely crucial. There is no way that nutrition education in a medical school can possibly function in isolation.

Nutrition cuts across all areas of medicine, and therefore should be incorporated into the various disciplines, and I think that to the extent that this is able to be recognized, accepted, and carried out to that extent, nutrition education may become truly effective.

Financial support undoubtedly is a crucial factor. We have been fortunate to receive some funding from several sources that have enabled us to do what we have done, but obviously, if we had greater financial support we could do more.

I think a faculty coordinator or director is another factor which is extremely important. Nutrition education in the medical curriculum needs the leadership. It cannot be left up to everybody to pitch in and do it. There really has to be some specific leadership with respect to this.

I think that development of clearly defined goals and objectives is also extremely important, and these should be articulated. This is an important roadmap, and gives directions to where we are going.

Another factor that we found to be extremely important is visibility of nutrition in the curriculum and, of course, at the bedside. Utilization of a variety of approaches, I think is important, and this way we can reach students with varying backgrounds, varying interests, and varying amounts of knowledge regarding nutrition.

We feel that an interdisciplinary approach has been effective. Since nutrition cuts across all fields of nutrition, no one person will have expertise in all areas of nutrition, therefore we have found that an interdisciplinary team approach is a major plus.

We also feel that focus should be on patient-oriented nutrition education. This I think is the only way that nutrition education will be relevant and meaningful, and therefore accepted by the students.

Other factors that are important in our program is the fact that nutrition should be a required aspect of the curriculum. If it is offered only as an elective, it certainly does not therefore have a very strong position as being an essential component of health care.

Secondly, if it is only an elective, many students will not be exposed at all to major concepts. If it is taught as a component in other courses, then nutrition may not come to be recognized by the student as an essential aspect—of health care.

We have also found it extremely important to continually monitor what is being taught in the whole school, not just in the nutrition course, per se if there is one, but also in all other modules in the school.

I say that because the curriculum is constantly changing. Every year our curriculum changes, so every year you have to assess and identify what concepts are being covered throughout the entire curriculum. This is the only way that you could integrate it, and make sure that the major concepts are covered.

We also feel that to develop specific educational objectives is also extremely important in directing acquisition of knowledge by the students.

We feel that to have the nutrition faculty based in a clinical department, such as medicine, or sometimes referred to as internal medicine, has been a favorable one in our situation. Of all the disciplines of medicine, perhaps the department of medicine is the most suitable, or has the most suitable orientation, and focus for assuming responsibility for nutrition education.

We feel that visible nutrition research has been a generator of new knowledge of nutrition to patient care, as well as to the prevention of disease. We feel that nutrition research is important.

Furthermore, another factor is the visible community involvement in nutrition-related health matters. In our school, I think that this has provided some positive focus on nutrition.

Now, we have developed a nutrition task force. This task force has representation from the basic sciences, from the medical sciences, from the nursing and dental schools, and this is a way that we can maintain some kind of effective, planning, participation in a variety of disciplines.

The members of this nutrition task force participated very actively in almost all the things that we try to do. Some of these are listed here for clarification purposes. Just to review it very quickly:

This whole team is involved in the required course that we have for our second year students. They are also involved in helping us to monitor the nutritional concepts that are covered in the various courses in the school. They are involved in helping us to develop a nutrition lecture series, which we have each year. This involves outstanding physicians to come to our school and speak, and to be available for students, our faculty, our medical faculty, and house staff. Invitations are also extended to physicians in private practice in the community, and we have a large number that attend. This is one way of continuing education for practicing physicians. There is also the therapeutic nutrition luncheon conferences which we hold for students in their third year. In this the dietitian does play a very important role in discussing characteristics of therapeutic diets, participating physicians play a very important role in discussing the medical basis of diets in particular disease entities.

The nutrition task force also is instrumental in activities such as nutrition-related research. Many students and faculty are involved. I think this has helped to stimulate the challenge, the acceptance, and the educational impact, of nutrition in our school.

The development of a nutrition knowledge pretest, posttest, which is given to all the students as they enter the medical school, and then as they graduate from medical school, is one way in which we have tried to develop a mechanism of evaluation. It will take a few years before we see any trend with respect to this.

This task force is involved in several nutrition electives, and also involved in continuing education conferences, open not only to students, but to physicians in the local area. We are very much looking toward the development of a clinical support team operating in the major teaching hospitals, but so far this is only carried out on a minimal basis at the moment.

Although we have been able to achieve a number of things, we still have many things that we need to overcome, problems that we see in further development. Some of these are outlined on the next slide.

Funding, of course, to support a variety of things, as we see most crucial, would be: (1) Expansion of our nutrition faculty, which is essential; (2) development of a clinical nutrition hospital team;

(3) expansion of nutrition research activities, and (4) expansion of dietetic positions for more comprehensive dietary counseling.

Other problems that we have seen, or need to deal with, include a planned way to provide for nutrition as an aspect of ambulatory medicine. I think we are only beginning to touch this. These are the hundreds of outpatients who definitely need to be reached in a much greater way. We are barely touching the surface there.

We also realize that there is a lack of recognition of nutrition as a medical subspecialty. We feel that this probably discourages many medical schools from developing a nutrition department in their schools, and may discourage physicians from going into nutrition as a subspecialty.

We also recognize the problem of integrating sociological, cultural, psychological, and economic aspects of nutrition with the medical aspects of nutrition.

I think this is an area where we need to do a great deal more.

Another problem relates to the need to develop evaluation methodology for finding out really how effective we are, and what direction we are going to take. Another problem that we see we really need to develop is the incorporation of nutrition assessment and management by all the faculty and health staff positions on our staff.

So I think to sum up, though, we have not been able to achieve some degree of progress by assuming sort of a broad perspective in carrying out a number of various activities, we still have much to accomplish, and we look forward to trying to develop our program, and to continue our work.

Thank you.

Senator **Bellmon**. Thank you, Dr. Young.

Dr. Metcoff?

Dr. **Metcoff**. Senator Bellmon, I want to express my appreciation for being invited to participate in this. But I would also like to express my appreciation to the citizens, to you, and this subcommittee for starting the ball rolling with the enabling language that we hope is going to move some action in the area of nutrition.

It is fine for those of us who are concerned to talk about it, but some place it really has to be implemented, and so I want to express my appreciation, and I am sure that of the other panelists, to you and the subcommittee, for your efforts, and assure you that we want to continue to help as much as we can.

Senator **Bellmon**. Doctor, before you go on, I would like to suggest that we furnish each of our panelists with copies of that language, and ask you if you feel it is sufficient, if you have not already. I do not know. We will appreciate it if you will give us your suggestions as to how we might improve upon the language.

Dr. **Metcoff**. Time is short, and I want to depart from my prepared remarks, and refer only to some sections of them. I would also like to start at the end.*

Senator **Bellmon**. Very well.

Dr. **Metcoff**. I would like to start with what I see some recommendations that may be useful, and in some way will summarize many of the comments that have been previously made.

---

* See p. 85 for the prepared statement of Dr. Metcoff.

First, I think that we have to define what we want to accomplish with nutrition education, what are the specific objectives for the short range and for the long range?

Second, methods have to be developed to test different stategies to achieve these objectives, some innovative programs will undoubtedly emerge and, third, we have to encourage development of identified nutritional units in the health sciences center, and then fund them for a reasonable time in order to allow continuity of program development in the creation and encouragement of faculty and students for participation in nutrition programs.

Then finally, a method has to be developed to periodically carry out the effectiveness of those programs to determine what patients should be taken, if revisions are necessary.

Now, I have used the term health sciences center, rather than medical schools, in order to emphasize the concept that nutrition is interdisciplinary. Education and training programs in science and human nutrition must necessarily involve students and faculty of various colleges comprising health centers and campuses.

As far as our own program is concerned, I comment on it only in the sense that it may be of some interest, because it provides another model.

We wanted to motivate the future provider of nutritional advice to effectively employ contemporary knowledge of human nutrition for the maintenance and improvement of health, as well as for the treatment of nutrition-related diseases. That is, to provide a before-the-fact-of-illness approach to the use of nutritional intervention, rather than an only-after-the-fact approach.

A carefully planned program had to satisfy the need of several colleges for which it was developed. It seemed administratively feasible, and was designed for careful evaluation, and we hoped it would be a suitable one for us as a prototype by other institutions.

We thought several features were unique. First, that nutrition education would become a part of the health experience. It is now in perhaps a third of our schools.

Second, we had gotten the deans and curriculum representatives of each college to work together to define the curriculum objectives, and believe me, that is no small accomplishment.

Third, professional educational evaluators participated from the earliest stage of planning of what was to be a three-level course.

Fourth, we proposed to use existing faculty, reimbursing their colleges for their time, thereby making the program truly interdisciplinary and responsive to each college, but owned by none.

I have attached a diagram to my remarks to indicate these three levels.

During the development of this proposal to implement our program in human nutrition, several realities became apparent, and the difficulties are applicable to most schools in some degree. They have all been commented on by other physicians, so I will not dwell on these remarks, except to add that fragments of nutrition are always taught by many different departments at different times, and each is taught from its own highly focused perspective.

Dr. Sandson mentioned this. For example, biochemistry teaches nutrition and enzymes; physiology, nutrition, and muscle contraction;

surgery, nutrition, and life support after the stomach is removed; pediatrics, salt and water therapy, infant feeding and nutrients to avoid for sick infants, and so on.

No department teaches nutrition, health, and the life cycle. Second, in our school everyone agreed that nutrition education should be holistic, integrated, and comprehensive, but no department would undertake that effort at a sacrifice of its classical curriculum.

Of course, a senior faculty person had to be designated, and then the most troublesome thing, of course, was finding curriculum time, and finally, the last, and I think the major issue was to find and identify faculty who were competent to teach nutrition.

We are extremely limited in that area. We have no money to develop such faculty, or to recruit them.

This is what we did. We defined the contents, and incorporated it in a study guide, and used that as a framework. Then we created two video tape families, one poor, and the other middle class. In the poor family, Tina, a 15-year-old teenage mother, is unmarried, and is in the middle of her second pregnancy. Her food preferences run to snacks, junk foods, and pop. She does not have much energy, fights with her mother, and resents any outside intervention, but she will talk to the school nurse, and does attend the university clinic.

Tina's little 1-year-old boy, Bo, has failed to thrive, and is developmentally behind. Actually, he is cared for mostly by Tina's mother. Tina has a 9-year-old brother, Jim, who has rotted teeth. Tina's mother, Jane, is 32, very fat, and is a diabetic. She spends most of her time either in the kitchen or in the living room watching television.

Bill, Tina's father, is 36 years old, a laborer and an alcoholic. He knows he is an alcoholic, but is sure he can quit any time he wants to. They participate in the Federal family food assistance program, and several child feeding programs.

Our other family, the middle class one, has a 21-year-old daughter, Gail, who has just had a baby, born with fetal malnutrition. She is a confirmed, strict vegetarian. Her first child, Michael, now 3 years old, has been raised on a vegetarian diet, and is now quite undernourished.

Gail's husband, Eric, is 22 years old, and is an ovo-vegetarian, that is, eats eggs as well as vegetables, and jogs regularly, at least 5 miles every day. Gail has a brother, Loren, who is 15, obese, and has diabetes. He is having quite a lot of problems in school, and with his peer group.

Gail's mother, Virginia, is 42, quite stylish. Appearance is very important to her, and she is constantly trying out all the new fad foods and diets recommended by the magazines that she reads.

For example, what to eat to have beautiful hair, skin of a youth, the figure of a model, the energy of an athlete, and to be socially desirable. Her husband, Mark, is 45. He has been very successful in his business, which does involve quite a few business lunches, with a few martinis. He is overweight, and rather worried now, since he was just discharged from the hospital, after having had a coronary.

Gail's grandmother is 66. She appears much older, is very thin and very picky about her diet, because she has been wearing dentures for 10 years, and cannot eat all foods with comfort, or without embarrassment. He husband, Gail's grandfather, is 70, and occupies most of her time, he has a gastrointestinal tract cancer, is becoming quite emaciated, and is afraid to eat because of discomfort. He sees a doctor, who knows he needs an operation, but feels that he is deteriorating so fast that nutrition treatment will not help, and he is afraid that the operation might prove too much for him.

Of course, we do not really want to wish all of those ills on any two real families. They are hypothetical, but they do illustrate every nutrition problem that is prevalent in our society today, disguised in the Tinas and Gails, and the Marks and the Bills, who need, but do not get, the nutritional guidance required to make them more effective citizens.

These families represent the nutritional challenge for all health professionals. Yet health professionals often fail to recognize gaps in contemporary nutrition knowledge, or to discriminate between dogma and fact.

There is a tendency to oversimplify rather than to deal with the simultaneous complexities of reality. My feeling is that when health professionals learn and apply contemporary knowledge of nutrition, and how to work together to meet the human and nutritional needs of these families, we should have no trouble teaching health profession students how to address and meet those nutritional needs, given the opportunity to do so, but we health professionals have to learn first. That can only be accomplished by training and participation in nutrition programs.

There are too few of these, and they cannot survive or grow without support.

Thank you.

Senator BELLMON. Thank you, Dr. Metcoff.

Mr. Rutledge?

Mr. RUTLEDGE. I will take the hint and keep mine abbreviated also.*

My name is Jack Rutledge. I am a fourth year medical student at Duke University Medical School and now president of the American Medical Student Association. It is an opinion organization representing 23,000 medical students throughout the medical schools in the country.

I would like to thank you for inviting me to testify here. I am not an expert in nutrition or in medical education. I am a medical student, a consumer of medical education and, therefore, very interested in seeing more nutrition including the medical curriculum. It is from this vantage point that I will offer some of my remarks today.

It is my feeling that physicians should have at least a minimum level of knowledge and skill in the area of human nutrition. We should be able to instruct our patients in principles of correct nutrition, answer questions and solve problems about diet, health, and disease, recognize and treat disorders arising from malnutrition and perform a routine nutritional assessment on all patients. We must address the issue of nutrition, not only as a tool for prevention but also as a treatment modality.

As physicians, we should be able to offer sound nutritional advice to all patients, especially those who are pregnant, breast feeding, raising a family, and the elderly. All physicians should understand the nutritional component of common diseases, such as diabetes, hyperlipidemia, and renal disorders. We should be able to answer questions patients have concerning the many fad diets currently being advocated.

---

* See p. 92 for the prepared statement of Mr. Rutledge.

Last, and certainly not least, as physicians, we must be able to apply all of this information to the everyday eating habits of our patients.

The ideal would be for all physicians to have the knowledge that I mentioned above. Unfortunately, very few physicians have this level of experience in the area of nutrition and of those that do, they have not gained it through the typical regular medical curriculum.

Some of the problems addressed today, and why we do not have more nutrition educational medical schools seems to boil down to the lack of commitment of the medical schools because they have such demand for the curriculum. I must admit this is one of the first times that I have ever agreed with so many professors in my life. If you have problems following my testimony, characteristic of how most low-budget students, we rely on a lot of volunteer help. So the last pages are first and the first is probably last. But they are interchanged there.

What can we as medical students do to increase the interest and commitment both by other students and of the medical school? I think there are some things. My organization, in the last few years, has developed local projects that we submit to different chapters. We have minimum funding, but we can provide some funding if a student at a medical school is interested in a specific project. Examples of the past have been preventive medicine, sex education, venereal disease education, and occupational health of the format is one of—we will provide some seed money and the students will provide a seminar series. It will meet during the year and then the students will try to encourage the faculty to incorporate this as part of the regular curriculum. We have had phenomenal success once you have the students motivated, saying, hey, it is something that has not been addressed in the past, and if we are going to address the problems of our patients, we need to know this. When you have a mass of students saying that, most medical school faculties are very responsive. I think the area of nutrition is no exception.

We started this year with a minimal grant from the Nutritional Research Foundation to provide funds again to some of our local medical schools. Student organizations, we try to design programs in nutrition and, hopefully, in a couple of years, we would then be able to get faculty realizing also the importance of it. How is this applicable now? I feel the first thing we must do is, as students that are interested in nutrition, expose other students to it. Get speakers at our local schools, show reports on nutrition. As we pointed out here, some of the terrible examples actually in the disease processes but also some of the positive aspects of what we can do in nutrition. How it can improve the situation of so many people just by giving a little information to others, the health providers in the areas of nutrition. I think by getting our students interested in this, they could put pressure on the faculties. This is something that I see an organization like mine can do.

Now, addressing the question of what can the Federal Government do. I think one of the problems that we hit upon is the funding. We need to have programs that are well designed and, unfortunately, this does take money. I do not want to paint a totally negative picture on nutrition education. Schools are doing an excellent job in a meaningful way. Much improvement has taken place in the last few years. But what would we think would be an excellent and adequate program in nutrition?

Let me point out a few examples.

In order for nutrition to receive proper emphasis in medical education and practice, it should be included throughout the continuum of medical education. It should be included in the medical sciences as well as the clinical schooldays. Medical schools should have a separate division, at least a division within a larger established department with the responsibilities of coordinating these activities. This department should be staffed by physicians and other health physicians. During the basic sciences, nutrition should be taught as a separate course which should, with clinical applications of case studies students should be able to see practical application to what they are learning. Their course should receive emphasis equal to that of other more standard basic science courses.

During the clinical years, separate elective and clinical nutrition should be available which cover the practical everyday uses of nutrition in medical practice. They should not be limited to certain specialized areas such as hyperalimentation. Regular seminars on applied nutrition should also be included. These activities should be coordinated with the nutrition department and would reach a greater number of students.

Postgraduate training programs, especially those in the primary care specialty, should also teach applied nutrition. This can be done by having onstaff clinicians interested in nutrition and again could be coordinated with the department of nutrition at the medical school. If funding limitation makes it necessary to choose between these various activities, the postgraduate training programs should probably receive priority, for it is during residency training that most physicians learn and retain the knowledge and skills they will use regularly as physicians.

Finally, as pointed out before, continuing education courses covering basic applied nutrition should be offered to practicing physicians. I think one of the main things we are dealing with, too, is the definition of the problem. Frequently 95 percent of all medical schools have nutrition in other courses. It is not at all obvious by what we mean. What we are saying is that we are getting down to the core levels, look at what we are teaching applicable to the everyday process, can I apply this, can I evaluate this fad diet? Do I know the tools to evaluate such a fad diet or can I advise my patient on what is a sufficient amount of vitamin C? These are the questions that we need to involve ourselves with in the medical schools.

Again I thank you for allowing me to come here, and I pledge from the medical students we will do everything that we can to get interest generated, and if all the medical schools are as interested as the professors here are, I think we can make some great improvements.

Thank you.

Senator **Bellmon**. Thank you, Mr. Rutledge.

Now, we are past our time limit so I will have to be brief. Again I will submit some questions to you in writing and ask that you respond.

First, Mr. Rutledge, it seems from what you say that a lot of the emphasis for nutrition education may be coming from students and from the American Medical Student Association.

Is this an accurate impression?

Mr. **Rutledge.** We cannot take credit for all of the emphasis, but we are dedicated to it.

Senator **Bellmon.** So you feel that you have a means of making your wishes know to the faculties and the administrators of the schools and that you get responses or results?

Mr. **Rutledge.** Certainly. I think the students have been very loud in their expressions in the last 2 years. One example is that through the grapevine, other students found out that we might have some money available this year for some seminars on nutrition. I have already had 12 students from different medical schools calling, asking about this. Once you have the students involved, the faculty is pretty quick in finding out that the students need something like this. I think that may be the key to putting nutrition in.

Senator **Bellmon.** We may get some different points of view from Dr. Sandson or Dr. Metcoff.

Do you feel that students should have a voice in curriculum—do you pay any attention to it?

Dr. **Sandson.** I think they should have a significant voice, and I think when the curriculum committee and the faculty hear that the students do not get enough training in nutrition, or primary care, and issues such as death and dying they will respond and build the subjects into the curriculum. I think it is very good to hear from the students on these matters.

Senator **Bellmon.** Is there any difference of opinion?

Dr. **Metcoff.** I do not think the students should have a voice unless they are willing to assume the responsibility and the issue has been the difference between and anticipation and expectation on the part of both students and faculty, and the response to those expectations.

It seems to me that the students must have a voice in the development of curriculum, I would say, especially nutrition curriculum. But they must also exercise ability to participate in that curriculum. Students have a great way of desiring programs and then not showing up for them.

Dr. **Young.** I agree with Dr. Metcoff on that point. I do find the students extremely interested in nutrition. I do not have any formal way to evaluate that except course evaluations by the students. Each class has a couple of students that represent the class. They develop an evaluation instrument, draw the conclusions from evaluation and so forth. Evaluations that I have seen in the past couple of years indicate a high degree of interest by the student.

Senator **Bellmon.** Do you get the same kind of input from physicians in the field who say they need to learn something that you did not teach them?

Dr. **Young.** From my experience, yes. I have frequently had physicians in private practice call me, some of them may be graduates from our school. They want to ask questions. I also get referrals from physicians in private practice who have a special problem that they would like additional counseling on and so forth, and so I am able to see patients on a consultative basis.

Dr. SANDSON. One of the things that has been mentioned that needs to be stressed again is there is probably a whole generation of practicing physicians whose training in nutrition has been deficient, and we do need to find a way to update them. I think that this is one of our important missions, as well as teaching current medical students about nutrition.

Senator BELLMON. I believe it was Dr. Altschul who mentioned that Georgetown has a 1-day seminar approach to teaching the practicing physicians nutrition.

Does that seem appropriate to you?

Dr. SANDSON. We have tried an annual continuing medical education conference on nutrition. We have been holding it each year at Cape Cod, and have been getting a moderately good attendance.

What I would like to emphasize is what has been already suggested by others; namely, that the format for continuing education needs to be studied so that we determine whether a physician's behavior is improved by the continuing education efforts. I think 1 day would not be enough. One week gets people interested and involved. It takes more than 1 day to do that.

Dr. YOUNG. We have a conference which goes to about 75 hospitals in outlying districts to that southern part of Texas, and it reaches almost 1,000 physicians on a regular basis. We have teleconference, a two-way system, whereby they can ask questions of the physician. A number of these have been devoted primarily to nutritional discussions. This is one way to reach the practicing physician that we found very effective.

Dr. Metcoff, I do not have any data, but I wonder how effective the programs have been. There is a kind of paradox which exists if we have had effective programs for education particularly of physicians, why do we have this morass of lack of nutrition knowledge?

It seems to me that our programs have not been effective and that I do not know why the reason for that is, but I suspect one reason is not so much lack of interest, but lack of commitment. It is possible for individuals to read an article, go to a conference, attend seminars, perhaps even to devote a week and emerge more knowledgeable than they started, and then do nothing about it. That is where I wonder if we are not coping with a bigger problem. It would seem to me that one way we could approach this would be to develop some kind of interactivity in a community which would involve physicians with a nutrition interest or orientation to—marry, if you will, the physician, the university faculty, and the medical student as well as other health disciplined students into such teams to tackle the problem such as nutrition in a nursing home or are the children getting school lunches adequately nourished. There are many problems in the community that could be tackled by all the aspects of nutrition, which might be taught and applied. Perhaps if some kinds of—could be taught, and it would be somewhat different in every community, I think perhaps we would perhaps have a better educated composition.

Senator BELLMON. In your testimony, you described numerous medical problems. Frankly, I wondered if the problems were not impossible and hopeless. I think if your students could deal with these, they could deal with anything.

What is the situation indeed? These families are presented as classroom cases, I assume, for your students, and it helps them to understand and deal with real live cases?

Dr. **Metcoff**. They are not so much cases as in nutrition—they provide the mechanism to provide basic information for the student about the background of each of these problems, the nutritional component in it and mechanism for dealing with how to identify and how to deal with it.

So we use these families because they represent that real life situation which the student and the faculty have to face every day. It does not really help to talk only about the most exotic problems because the student is going to see one exotic situation for a thousand others. True, if you can resolve the exotic situation in the case of death or knowledge which will be applicable or the other things.

Senator **Bellmon**. But these families are not used in any effort to retrain practicing physicians?

Do you use them in any television instruction?

Dr. **Metcoff**. No; not because of any lack of procedure. We are really just starting, and our start is to create a semblance of recognition among medical students that there are ways, that there are problems that can readily be dealt with from a nutritional basis. Help them to do that and then when we get beyond that, we can undertake other levels of education.

Senator **Bellmon**. In your testimony, Dr. Metcoff, you mentioned that you asked for a grant and that you got one-tenth of what you asked for. We are hoping in our next budget to have $5 million to start nutritional educational programs in medical schools. We realize this is not enough in the long run, but we also anticipate that it will be sufficient for a first year's effort.

Could you each tell us how much budget, if you have any realistic idea, that you feel would be appropriate at the university that you come from, to deal with the nutritional educational responsibilities?

Dr. **Young**. I have to think about that for a minute.

I did have some figures in my testimony.

Senator **Bellmon**. Our problem is we need to have some idea of what the funding needs to be. We are sure $5 million is not enough.

Dr. **Young**. It is hard for me to come up with a figure.

If you are including faculty costs and so forth, I would say a budget of $50,000 over, say, a 3-year span might be adequate to get a program off the ground. That is just a rough ball-park figure. But when you consider the cost of faculty involved in developing the program, I think that it would be sort of a ball-park figure.

Senator **Bellmon**. I am not going to ask you, Mr. Rutledge. You are not supposed to know.

Dr. Metcoff, do you have a figure in mind?

Dr. **Metcoff**. Yes; over a 3-year period, a minimal estimate for our program is $500,000. This would permit us to recruit and develop faculty and to provide some continuity. I would emphasize that the continuity aspect of program development is of extreme importance, $500,000 does not go very far, if you have a very strong intent to have multiple colleges participate in a program, so it is true interdisciplinary. I would say for our program that might be a benchmark.

Senator **Bellmon**. Would this include funds for retraining?

Dr. **Metcoff**. Yes; it would.

Senator **Bellmon**. And reeducating practicing physicians?

Dr. **Metcoff**. Yes; but we would intend to do so not with seminars but with asking them to participate in team effort and the third level which would bring them in direct contact with students in a problem oriented approach to the community or in the hospital.

Senator **Bellmon**. Dr. Sandson?

Dr. **Sandson**. I do not have a precise figure, but I think around $100,000 a year would provide the money needed for the educational programs in nutrition. I think it would be best if one can think of developing some means where that funding could be ongoing rather than temporary. This would enable more stable programs to be developed.

Senator **Bellmon**. I would say if we can succeed in getting this appropriation initiative approved, I think that would give you assurances. It very likely would not be discontinued unless we found it to be a mistake.

Mr. Rutledge?

Mr. **Rutledge**. I was going to say give our organization $10,000 and we could get a heck of a lot of interest and commitment in 1 year.

Senator **Bellmon**. Doctor, you did some figuring. Did you change your estimate?

Dr. **Young**. No; I do not think I would change what I said. I think $50,000 per year, for 3 years, would be an estimate of getting a program started. I had figures on the cost of mental education that was a little bit different.

Thank you.

Dr. **Metcoff**. May I just comment with respect to my figure or our videotape families for information of a small private organization that does such things, the charge was $40,000.

Senator **Bellmon**. Well, after we get the program going, we will probably have some better idea as to what we need. I have a couple of additional questions, and then perhaps we had better go on to the other panel.

There have been a lot of comments made this morning. I certainly agree with you that one of the problems is to find qualified faculty people who can deliver the kind of nutritional education that I think we all agree the country needs.

Is there a supply of these people around?

There is no sense funding the nutrition program if there is no one to carry out the instructions.

Is there a reservoir of these people available?

Dr. **Sandson**. I do not think there is a very big reservoir. There probably are enough people so that faculty members can be found for some new program. If suddenly the 60 or so schools that currently do not have nutritional programs wished to have them, adequate numbers of well-trained faculty would not be available.

Dr. **Metcoff**. I would guess that there is no reservoir for the development of identifying departments or units of nutrition in medical schools. There are enormous numbers of physicians with some expertise in the area of nutrition who practice that exercise and would be very useful, and perhaps it is that kind of reservoir that one could build on. But to have an all-encompassing nutrition program, I suspect that there are very few such individuals available. One of the missions I would hope of this kind of legislation would be to help develop such a program.

Senator BELLMON. Most of our witnesses this morning had indicated that a person would need to be trained fully as a physician or as a veterinarian. It would surprise me that a person could teach nutrition if their background was not such as that.

Dr. YOUNG. I will comment on that since I am not a physician.

I think that if I was 20 years younger, I would like to go to medical school and acquire an M.D., and it would be very helpful to me. I recognize the importance of making nutrition clinically relevant.

I think perhaps I have been in a unique situation inasmuch as my background is Ph. D. in nutrition, but I have been situated in a clinical department where I have worked very closely with clinicians. Most of my research has been clinically oriented. Therefore, I feel adequately prepared to know what is important in terms of nutrition as applied to medicine. So I think that for me it has not been that much of a problem.

If I had been isolated in a biochemistry department or a basic science department without clinical collaboration, without my fellow clinical faculty members, then perhaps I could not have been as effective as perhaps I have been. So I think it makes a great deal of difference as to the orientation in the schools.

Also, I would like to say from my viewpoint and my training background, as a nutritionist, that I come with a little different perspective than most of my colleagues that have come up through the medical school, and I do not think we complement one another in many respects. Many of my physician colleagues do not have expertise in dietary counseling and therapeutic nutrition and so forth, whereas I have that kind of expertise.

So I think together that we form a team that is extremely valuable. So I think it is possible to have a combination like that.

Dr. SANDSON. I think one of the deficiencies in the way medical schools at least have taught nutrition has been the lack of clinical relevance in much of the educational experience. One needs both basic science and clinical nutrition during the educational experience if one is to adequately train the students. If one does not bring the teaching to the point of clinical relevance, students, do not come out of medical schools with what they need. I have known faculty with either a Ph. D. degree, an M.D. degree, or both degrees. As nutrition is now being taught in medical schools, it gets more and more involved in clinical matters. I think there is a difficult point in teaching medical students nutrition if the teacher does not have an M.D. degree. It is the point where nutrition involves the practice of medicine. It can be done, but there is often some difficulty.

Senator BELLMON. Let me ask Mr. Rutledge a question. If you choose to specialize in nutrition along with the practice of medicine, could you get this kind of training?

Mr. **Rutledge.** I am not really sure. The others might know more about it specifically. You can at other institutions get electives in nutrition. As far as beyond that, masters in nutrition or in your residency, specializing in nutrition, as far as an aspect of internal medicine or family practice, I am not specifically sure how much training there is. I know some other schools do have more of an emphasis, specifically the residency years. I do not know whether that answers your question or not.

Senator **Bellmon.** Let me ask any of you this question.

Are any of your schools trained to teach people in this field, so that if we fund a program of several million dollars a year, are we going to get the professionals to do the job?

Dr. **Sandson.** We are involved in two types of programs. One is a Ph. D. program, and the other is a M.D.–Ph. D. program.

Senator **Bellmon.** Some of them would be 40 years old by the time they got through with school, would they not?

Dr. **Sandson.** They would be about 30 years old. I would think most students could get a Ph. D.–M.D. in about 6 years.

Senator **Bellmon.** But then there is all the training and hospital internships that have to come in, is that not true?

Dr. **Sandson.** Yes, it is true, and I think it depends on what type of individual one wishes to go into these faculty positions. In the best of all possible worlds, you would like someone who is well trained in basic science and well-trained clinically. These individuals will have probably 8 to 10 years of training by the time they finish.

We also want them to be good investigators. So one is looking for a sophisticated kind of person to take on these faculty positions.

We have another program with MIT which would also train that type of person. MIT recruits people into a Ph. D. program who have already obtained their M.D. degree. Boston University provides them clinical experience in nutrition in our nutritional unit at University Hospital.

Senator **Bellmon.** We have used up more time than we should. There are many more questions that I would like to raise, but we will do so in writing.

Let me say that the subcommittee has made efforts to look into nutrition education and we seem to find that there is more interest and activity going on in the schools you represent than perhaps anywhere else in the country, and that there is significant lack of such activity in general.

It looks to me like here is an opportunity for some of you folks to surge ahead and pave the way. I hope you will. Perhaps there are some schools that are not quite as deeply involved in nutrition training that might be able to find a real opportunity here. I hope that there will be a place in the future that Jack Rutledge can go to get this kind of training.

Thank you very much.

Our next witness is Dr. William D. Holden, member of executive committee of the National Board of Medical Examiners, and chairman, Committee on Research and Development, Cleveland, Ohio.

STATEMENT OF WILLIAM D. HOLDEN, M.D., MEMBER OF THE EXECUTIVE COMMITTEE OF THE NATIONAL BOARD OF MEDICAL EXAMINERS; CHAIRMAN OF THE BOARD'S ADVISORY COMMITTEE ON RESEARCH AND DEVELOPMENT, CLEVELAND, OHIO

Dr. HOLDEN. Senator Bellmon, ladies and gentlemen, I am here as a member of the executive committee of the National Board of Medical Examiners. I am also a professor of surgery at Case Western Reserve University, recently retired chairman of that department.*

The National Board of Medical Examiners is a voluntary nonprfit organization established in 1915. The basic purpose of the National Board is contained in the preamble to its constitution and bylaws which states that:

> The purpose of the National Board of Medical Examiners shall be to prepare and administer qualifying examinations of such high quality that legal agencies governing the practice of medicine within each state may in their discretion grant a license without further examination for those who have completed successfully the examinations of the National Board and have met such other requirements as the National Board may establish for certification of its Diplomates.

Up until 1958, the National Board prepared examinations for certification leading to licensure. Since then, the number of clients which the National Board serves has increased rapidly so that multiple specialty boards, professional societies, and other agencies such as the Educational Commission for Foreign Medical Graduates are served through the development of certifying and recertifying examinations, in-training examinations, self-assessment examinations, and examinations for the certification of some allied health professionls. The total number of examinations prepared by the National Board during 1977 was 190,196.

The National Board's own examinations, the parts I, II, and III, are administered to medical students and recent graduates, and are recognized by 48 of the 50 State licensing boards as one assessment procedure that may be used to qualify physicians seeking licensure. The board also provides an examination in cooperation with the Federation of State Medical Boards for another route to licensure. This examination is called FLEX or the federation's licensing examination, which is recognized by the 50 State medical boards.

The examinations that are most intimately related to medical education are the parts I, II, and III National Board examinations. Part I is given to medical students after 1 or 2 years of medical education and it addresses in depth the student's knowledge of the basic medical sciences—anatomy, behavioral science, biochemistry, microbiology, pathology, pharmacology, and physiology. Test committees consisting of faculty members devise the examinations which are administered twice a year.

The part II examination consists of multiple-choice questions of several varieties, and it addresses the clinical disciplines of medicine, obstetrics and gynecology, pediatrics, preventive medicine and public health, psychiatry, and surgery. It is administered shortly before students graduate from medical school.

Separate test committees are appointed for each of the subjects contained in parts I and II. Each test committee is responsible for an outline of subject matter that is divided into categories. The outlines are reviewed and updated each year when new categorical subject matter should be introduced into an examination. The committee members are responsible for generating questions in accordance with the outline.

---

*See p. 89 for additional material furnished by Dr. Holden.

In addition to critical scrutiny of the questions within each test committee after each of the subject tests is devised, the chairmen of all the committees meet to review all the subject examinations in order that duplication may be avoided and that an equitable balance of all subjects is introduced into the composite examination.

The part III examination is directed toward an evaluation of clinical competence in all clinical disciplines and consists of patient management problems and pictorial displays requiring professional judgment for their interpretation. As the final step for candidates seeking licensure, it is administered at the end of 1 year of graduate medical education or any time thereafter.

Altogether there are 15 test committees that develop these examinations. Each committee member serves for 4 years. For the 1978 examination, 108 individual faculty members are involved representing 71 of the 130 medical faculties in the country.

It is of considerable importance to recognize the interrelationship of the National Board and its qualifying examinations with medical education. The examinations are not designed to influence in any manner the content of the curricula of schools of medicine. Rather they are developed to represent broadly the content of what medical faculties throughout the country recognize as basic knowledge and judgmental abilities required for the satisfactory education of a physician. The content of the examinations is a distillation of subjects and problems agreed upon by test committee members who are drawn from medical faculties. The examinations therefore consist of content that is generally addressed in schools of medicine throughout the country.

The subject of nutrition is covered in multiple sections of both the part I and II examinations. For instance, in behavioral science, the interrelationship of emotions and motivation with adequate nutrition is covered. Biochemistry includes digestion, intermediary metabolism, enzymatic control, and utilization of fats, carbohydrates, and proteins. Pathology deals with multiple disease states that interfere with effective nutrition. Pharmacology addresses multiple therapeutic agents that control diseases and disorders that interfere with nutrition, such as antacids, antidiarrheal agents, and antiparasitic agents. It also deals with the importance of vitamins and the deficiency states resulting from inadequate nutrition.

Physiology addresses the role of the nervous system and alimentary enzymes in the digestive process. Medicine covers multiple functional and organic disorders of the gastrointestinal track that relate to undernutrition and overnutrition. Pediatrics deals with the interrelationship of nutrition to growth and development and the several disease states that interfere with it. Preventive medicine and public health encompasses a variety of social issues that influence nutrition. Among these are population subgroups, high risk social and environmental factors, health care costs, and the organization of health services, both private and governmental. Psychiatry deals with the psychologic disorders that have an impact upon nutrition with respect to both prevention and therapy. Surgery addresses parenteral nutrition for patients who cannot ingest nutritional substances orally.

The National Board examinations are developed in a manner to assure an equitable balance of coverage of the multiple areas of knowledge characteristic of each of the academic disciplines that are taught in the schools of medicine. In developing the examinations, nutrition is not an inconsequential subject but is addressed in all of its individual and social aspects with great care.

For the interest of the subcommittee, the following exhibits are being introduced: (1) The National Board of Medical Examiners Bulletin of Information and Description of Examinations for 1978 and (2) The National Board Examiner, volume 25, No. 4, dated May 10, 1978, which lists the membership of all National Board test committees for 1978. Additional information has been provided to the staff.

It has been a pleasure to appear before the committee and I shall be pleased to respond to any questions.

I have additional material that may provide answers to more specific questions concerning the relationship of nutrition to these examinations.

Senator Bellmon. Thank you, Dr. Holden.

As I listened to you recite the material relating to nutrition on page 4, I could not help but wonder why the surgeon who had passed this test would operate as we saw earlier this morning in the slides, when this person was badly malnourished.

Dr. Holden. Yes; I cannot understand that either, Senator.

Any patient in any hospital in this country that loses 45 pounds in the course of a serious prolonged illness has not been treated adequately, and it rarely if ever would occur on an effectively operated surgical service.

Senator Bellmon. Would you agree with me that that surgeon was inadequately trained in nutrition?

Dr. Holden. I do not know the surgeon, sir. And I do not know all of the other doctors that may have been involved. But certainly I would think that for any patient who has the capability of recovering, who is not wasting away with cancer intractable pain, there is no excuse for that kind of malnutrition developing within a hospital environment.

Senator Bellmon. As I listen to your testimony, and try to follow, and understand, I am very much a layperson, I am in over my head when we start using medical terms, but it seems to me that we might have a chicken and egg situation here. Your board is asking, in effect, the medical schools, what questions should be asked.

The medical schools, I imagine, are furnishing questions that relate to what is being taught. It strikes me that somewhere in this system there ought to be a voice raised for what should be taught. What we need. Rather than for the schools simply saying this is what our people know, so ask these questions.

Dr. Holden. Well, that is a good point, Senator Bellmon. Actually the medical faculties of this country have a significant autonomy in what will be taught and who will teach it.

The only extramural control over that kind of operation must be exercised through the accreditation process.

Senator Bellmon. That is you?

Dr. **Holden**. No; it is not the National Board. The National Board is only concerned with the assessment of individual competence. It is not concerned with the educational programs, whereas the accreditation process, which is carried out by a liaison committee is concerned with all the resources, administrative capability, operation and educational programs within a school of medicine.

This is the extramural agency that, in the interest of the public, is evaluating the medical school in its total operation.

Senator **Bellmon**. Well, now again, I am sorry I do not know more about this, but tell me more about the board. Who creates it?

Dr. **Holden**. There are 63 members on the National Board of Medical Examiners, and this consists of Ph. D.'s, M.D.'s, some university presidents, some individuals who are interested in allied health education. Appointments are also made on nomination by the Armed Services, HEW, AMA, AAMC, CMSS, ABMS and Federation of State Medical Boards. Students, residents, and public members are appointed.

The test committees are appointed by the chairman of the National Board. He obtains, through the staff, recommendations for positions from a variety of sources, agencies, individual people who are expert in particular areas, such as biochemistry, psychiatry, and so forth. These people are then appointed for a period of 4 years.

There are between 6 and 8 million individuals on each of the committees, but the National Board—to go back to your previous query, sir—has assiduously restrained itself from trying to interfere with the direction of medical education, because that is not its business. Its responsibility is solely to evaluate the competence of the students and graduates of medical schools.

Senator **Bellmon**. According to you—you say their job is to evaluate the competence of the medical graduates, but using what criteria?

To me the problem is this: You are using the criteria that the medical schools prescribe, because they are saying this is what we teach our students, but I think someone should also be asking the students to know what is needed to keep our population healthful.

Dr. **Holden**. This should be exercised through the accreditation process.

Senator **Bellmon**. That is what I am asking you. That is your business?

Dr. **Holden**. No; it is not, sir. The board does not accredit medical schools.

Senator **Bellmon**. It would seem to me that if you were convinced, and let's use nutrition as an example, if you are convinced that more emphasis needs to be placed on nutrition, that you could ask nutrition questions in the National Medical Boards and get the attention of our medical educators, that here is an area that is neglected.

Dr. **Holden**. That is being done, but again that procedure is instituted by the people who comprise these test committees.

One of the things that we are not in the business of doing is creating questions that do not relate to what is being taught in the schools of medicine.

Senator **Bellmon**. Well, now, I am not sure you perhaps fully understand the reason that the Congress is concerned. I am on the Budget Committee, and should have been there this morning, I guess, because we finally finished our resolution. But when you look at where we are spending our money, your money, the tax dollar, a great deal goes for remedial health care, and very little for preventive medicine.

We treat sick people, but we do very little to prevent people from being sick. We place our reliance on the medical profession to design our health care systems throughout the country, and I think that is the way it should be. The politicians should not be telling medical schools how to train doctors. But we do feel very distinct pain when the system is not working so well, and we find that medical costs increase at about 15 percent per year. What I am suggesting to you is that someone inside the system needs to sit up and take notice that there are methods of doing a better job. If they do not, I am afraid there is going to be some outside influence that will not be too welcome.

Now, if you tell me that your group is not the right one to deal with, that is helpful, but if we cannot get some assistance somewhere, either from you or the certification process, I am concerned that we may see the Board, National Medical——

Dr. **Holden**. The two agencies that have a major responsibility to address the problem that you are concerned about, are the American Medical Association and the Association of American Medical Colleges. These are the two sponsoring agencies of the accreditation body that reviews and accredits schools of medicine. These two organizations on the one hand represent all the medical schools, and on the other, represent the practicing profession. This is where the initiative must come from if nutrition is going to be addressed with greater seriousness in the schools of medicine.

Senator **Bellmon**. Are we going to ask the medical schools to, in effect, clean up their own act, is that what you are suggesting?

Dr. **Holden**. That is one way. But again through the American Medical Association, which represents the practicing physician. Primarily, this is a different source of initiative to address this problem.

Senator **Bellmon**. Do you think that the practicing physicians are aware of their—maybe I could say inadequacy in this field, and plead guilty?

Dr. **Holden**. I think they are not perceptively aware of their deficiencies in many of these areas.

On the other hand, there are many practicing physicians in this country who are very aware of specific problems related to nutrition, because they deal with it day in and day out. Not the least of these is overnutrition, which is probably, if you had to add all these problems up, a much greater social stigma than is undernutrition.

Senator **Bellmon**. My question still is, Where do we in Congress go to apply the pressure?

Dr. **Holden**. The specific agency to which this should be addressed is the Liaison Committee on Medical Education.

Senator **Bellmon**. Of the AMA?

Dr. **Holden**. AMA and AAMC. They accredit medical schools and determine what they are doing. The balance of educational programs as well as all the resources of the schools are reviewed.

Senator **Bellmon**. If this group was convinced that more emphasis needs to be placed on nutrition, then they could bring about this change?

Dr. **Holden.** Yes; because they periodically, from 1 to 7 years, review every medical school in the country, in great depth.

Senator **Bellmon.** If your group chooses to add questions on nutrition to the examinations that you give, could you do so?

Dr. **Holden.** We do so, not in a formal way, through the board, but through informal discussions within the test committees. As a matter of fact, before coming down here I reviewed the 1978 part I and II examinations.

In these examinations, there are many questions that I can defend as relating to nutrition, without any equivocation, and these do not deal with the peripheral aspects of nutrition. They amount to approximately 8 percent of this examination. These questions do deal with nutrition. There is other evidence that the National Board examinations are not ignoring nutrition in any sense of the word. We still have to maintain a balance of questions.

There is just an innumerable number of subjects that are sampled in these examinations, in each of the different categories, and a good proportion of the total questions relate to nutrition.

Senator **Bellmon.** The only point is, we are told that there are very few medical schools that require courses in nutrition. You heard that?

Dr. **Holden.** Yes.

Senator **Bellmon.** It appears that there is not enough emphasis, and we are also aware of the fact that very often the doctors seem to be persuaded they lack sufficient knowledge in this field as well.

Let me ask another question.

Do you communicate with those who make up boards. Do you make any effort to try to persuade them as to the kind of questions to put on the tests?

Dr. **Holden.** No; but, again as I mentioned in the formal testimony, the chairmen of all of these committees come together to put the final examination in order, and there is a great deal of give and take and criticism in achieving an adequate balance of subjects when that particular process goes on.

Senator **Bellmon.** When you look at the makeup of the people on the boards, are there any nutritionists?

Dr. **Holden.** Not as such, no. There are people who may have a major interest in nutrition, but they are not identified by name as a nutritionist but as a biochemist, gastroenterologist, or internist.

Senator **Bellmon.** Would it seem inappropriate to have some nutritionists involved directly, to have some input on this important side?

Dr. **Holden.** The number of other subjects that you would also have to apply the same mechanism to is almost infinite. If we identified, let us say, among 108 people, 10 who are identified as nutritionists, you would also have to start thinking about a variety of other people who had a major interest, or were identified, let us say, as an oncologist. If we were to have 10 nutritionists, it becomes an impossible logistical matter.

As an example what we do try to do among physiologists is to identify physiologists whose major interest is in different areas, such as the cardiovascular system the digestive system, the nervous system, the hormonal system, and so on, all of which play a role in nutrition.

Senator **Bellmon**. I think nutrition plays a role in all the various problems.

Dr. **Holden**. It does.

Senator **Bellmon**. It seems to me that we have the cart before the horse here. If we had a little more knowledge in the nutrition area we might not get too many diseases.

Dr. **Holden**. I think, sir, that nutrition, along the lines that you spoke about, is a horizontal subject. It goes across all disciplines, whereas medical schools and medical practice are constructed in vertical columns. This is one of the things that makes it difficult to create a horizontal enterprise.

But, especially it is important, as many people have said, to get the basic information into medical students, and then to also identify faculty experts in the different clinical areas who emphasize nutrition. In many areas there are such experts in these clinical specialties.

Senator **Bellmon**. Well, sir, I am convinced that there is a problem here somewhere, and I am not sure whether I can put my finger on it this morning. But is is pretty plain to me that nutrition education is not getting adequate attention in the training of our physicians, and at least I am convinced that our whole system reflects the fact that we are not placing enough emphasis on this side of medicine.

Of course, nutrition is a major part. I would like to suggest to you that in your work you are at least aware of this concern, and you could perhaps begin working together, in the medical profession, to do a better job of training people in nutrition to serve throughout the entire delivery of our health care.

Do you have any additional ideas that we should have?

Dr. **Holden**. I agree, sir, that there should be greater emphasis upon this subject within the schools of medicine.

On the other hand, I think the overall social problem of nutrition is not solely the responsibility of the medical profession. It concerns a variety of areas that society has to address directly, such as the lifestyle of the American public, the availability of resources to overcome malnutritional problems. A physician can, of course, instruct an individual about malnutrition, about adequate diet, and so forth, but unless a patient complys, and unless the patient has the resources to respond to this kind of direction, it fails.

Senator **Bellmon**. We in the Congress are providing some $10 million for some meaningful programs. We are putting out some money in an effort to fill nutrition needs.

Would it be inappropriate for me to ask you to furnish for the record the questions that are asked of the medical students?

Dr. **Holden**. Yes; we cannot release those questions here. They are completely confidential. I could give you examples of questions.

Senator **Bellmon**. Could you give us examples of the type of questions that you consider relate to nutrition?

Dr. **Holden**. Yes.

Senator **Bellmon**. Not now, but for the record. Why could not the questions be released, or made part of our record? Is there some secret? I assume every student is——

Dr. **Holden**. There are test questions that, without authorization, are diffused throughout the country, but I am talking about questions that are being employed in 1978, and will be employed. This is the examination that I reviewed, the one that will be given this month.

Senator **Bellmon**. Could you give us a copy, say, of the 1975, or 1976, or 1977 questions?

Dr. **Holden**. Arrangements can be made so that past examinations can be reviewed. I would point out that from year to year distribution of these subjects may vary.

Senator **Bellmon**. Would it be possible to get a copy of the last 3 years' examinations, not including 1978?

Dr. **Holden**. Yes; the board will be pleased to provide an opportunity for confidential review but cannot release the examinations for public record.

Senator **Bellmon**. Could we also get a list of the names and specialty of those who make up the board?

Dr. **Holden**. You have those, sir.

Senator **Bellmon**. We have them already?

Dr. **Holden**. Yes.

Senator **Bellmon**. Fine. Thank you very much.

I might say to our panelists, and to our audience, that Senator Leahy and I were successful in adding language to this year's Labor-HEW Appropriations Subcommittee report which directs the Secretary of HEW to undertake a program of support for those institutions willing and able to undertake the innovation of nutrition courses for health professionals through a competitive grant program.

It seemed to us this would be the best way to accomplish the program. It would be accomplished through interdisciplinary training funds in the Health Resources Administration. Several other projects are planned for that category, and the total funding for interdisciplinary training in the Senate appropriations bill is $10 million. The House appropriated $4.2 million.

Therefore, in order to get nutrition education for health professionals off to a good start, we need to persuade the House conferees to adopt the higher Senate figure. I am initiating a letter to Chairman Dan Flood and members of his committee, and am asking members of the Nutrition Subcommittee to join me in signing it. We are asking Chairman Flood and others of his subcommittee to accept the higher Senate figure of $10 million.

I would also ask those who are here and interested in this issue to contact Chairman Flood for the need of this appropriation, and see if we cannot wind up with the figure of $10 million, rather than $4.2 million.

Thank you.

Our time has ended, and the hearing is adjourned.

[Whereupon, at 12:05 p.m., the subcommittee adjourned, subject to the call of the Chair.]

ADDITIONAL ARTICLES, LETTERS, AND STATEMENTS

STATEMENT OF HON. BOB DOLE, A SENATOR FROM KANSAS

NUTRITION EDUCATION IN MEDICAL SCHOOLS

Mr. Chairman. As you well know, many contemporary and controversial nutrition and health issues have been raised in committee hearings here in the Congress in recent months: the fact that our food use has changed over the years, the relationships between food habits and disease, the risk-benefits of suspected carcinogens, the use of nutrition counseling as a disease prevention measure, the hows and whys of hospital cost containment—I could go on and on.

One statistic that erupts during each of these hearings has to do with the rapid rise in the nation's health care costs. Over $125 billion in 1975, this figure is projected to be over $200 billion in 1980.

MORE NUTRITION IN MEDICAL SCHOOL?

The usual response to this toppling federal budget figure—a response that is suggested over and over again as the panacea or solution to rising health care costs—is the need for more nutrition education in our medical schools.

Stated another way, the antidote to rising health care costs is plain and simple: more nutrition education for medical students, more applied nutrition by practicing physicians, and more positive attitudes toward nutrition by all medical personnel.

I am pleased that the committee has set aside this full morning to hear from these experts on the very important topic of nutrition in our medical training institutions. Sponsors of this hearing, the Senate Subcommittee on Nutrition, of which I am the ranking Republican member, are seeking expert opinions on the role of nutrition in medical education; in particular, the role as it leads to reducing our national health care costs, supporting our disease prevention efforts, and in short improving overall quality of life in America.

Back in 1976, an American Medical Association survey indicated that nutrition training was on the increase in U.S. medical school curricula. And preliminary findings to a 1978 update of this two-year-old survey demonstrated that interest in this topic continues to increase in our medical schools. Thirty percent of the schools reported having added more nutrition learning opportunities to the curricula over the two-year period. Yet many feel this is far short of a desirable goal.

KNOWN OBSTACLES

We're familiar with some of the arguments as to why there is not more and better teaching of nutrition in medical education:

Lack of competent professionals with expertise in nutrition to do the teaching.

Lack of time in the medical curriculum to squeeze in more information.

Lack of adequate funds and other resources.

Absence of a separate medical speciality in nutrition.

Failure of the medical examination process to adequately tap the subject of nutrition, to name a few .

This morning's witnesses have been asked to identify some of the obstacles or impediments known to them; impediments to the successful operation of nutrition education programs.

GREAT CHALLENGES

Like the impediments and problems, there are enormous challenges too. This morning, I would hope that the expert witnesses will also share with us their views of the real challenges. Speak to this committee about:

Whether there should be more nutrition instruction in our medical institutions?
If so, why should nutrition be taught?
What exactly should the teaching be?
Who should do the teaching?
And within what framework?
And more specifically, how?

POTENTIAL SOLUTIONS

The committee is looking forward to hearing from the witnesses, representing medical school administrators, students, physician faculty personnel, dietitian-nutritionist faculty personnel. We will also hear from a veterinarian who will shed some light on the academic preparation of a vet—with particular emphasis on training in nutrition.

And finally, we will hear from the national board of medical examiners. Many believe the answers to be nutrition education in any curriculum is easy—simply putting the right amount and kind of questions on the medical board exams. In this way you will be sure to "Get the faculty to teach more nutrition." We've asked a representative of the board to come and respond to this suggestion.

In conclusion, Mr. Chairman, I feel confident that testimony will be presented here this morning that will serve to help us better define the obstacles to more viable programs of nutrition education in medical schools, and also come up with reasonable proposals—legislative and otherwise—for consideration in the not too distant future. I would like to take this opportunity to thank each witness in advance for sharing his best thinking on this important topic with us today.

STATEMENT OF AARON M. ALTSCHUL, PH. D., PROFESSOR AND DIRECTOR, DIVISION OF NUTRITION, DEPARTMENT OF COMMUNITY AND FAMILY MEDICINE, GEORGETOWN UNIVERSITY SCHOOL OF MEDICINE

Thank you for inviting me to testify at this hearing.

There is no question in my mind that nutrition needs to become a formal and established part of the medical school curriculum. I am, however, concerned that both the fullness and the qualifications of the meaning of nutrition education be explored and understood at the outset, that the term nutrition education not develop an aura beyond that which it can deliver, nor that the term be restricted only to portions of what can properly be considered the province of nutrition education.

The word relevance is key to this discussion.

Let me begin by telling you of my personal commitment to nutrition education in a medical school. In cooperation with Professor William Horner (M.D., Ph.D.), Chairman of the Department of Biochemistry, and with the participation of faculty from various departments in the school as well as guest lecturers, we have been offering formal instruction in nutrition to medical students since 1971. This includes a series of lectures to the entire freshman class, electives available to students in the second year, and special programs as needed for students in the clinical years. In addition, we offer a refresher course to practicing physicians and a lecture series in nutrition to dental students. We consider practicing physicians as part of the program of nutrition education in a medical school. Regardless of whether they had formal nutrition in their curriculum or not, they should have the opportunity through continuing education programs to refresh and broaden their knowledge.

The Nutrition Division engages in research on the management of obesity, on the relationship between salt intake and blood pressure, and on methods for intervening in schools to improve the appreciation of good health practices particularly as they relate to nutrition. One objective of this research is to enable us to improve our presentation of these subjects to the students.

Our program has been growing; has a high visibility within the school; we are constantly evaluating it and looking for means to improve and extend it.

A major concern is relevance. In my view it is not enough that the material be well selected and presented, the student must also be shown how the information is best applied. Otherwise students can become frustrated and lose interest.

A guarantee of proper application does not simply follow increased exposure to nutrition information. The question before you is basically the following:

"How can the interventions by physicians in the health of their patients be made more effective by utilizing present knowledge of nutrition?" This question has two components: (1) prevailing knowledge by the physicians of relevant nutritional information, and (2) means of applying the knowledge in a practical way.

I recognize this dual character implicitly in the words "nutrition education" but I wonder whether more explicit treatment may not be necessary to avoid confusion.

Moreover, there are two aspects to nutrition in the United States. Both have their roots in the same physiology and biochemistry but they deal with the problem of optimum nutrition as approached from two directions. The first is nutrition under conditions of relative scarcity. This is the classical nutrition; it has been the major preoccupation of the human race from the beginning and is the major preoccupation of the majority of people living today, worldwide. The second is nutrition under conditions of relative abundance; this has become a major preoccupation of the so-called industrial societies. In the United States this encompasses the most important prevailing nutritional problems.

Poor people in the United States, however, are often in double jeopardy: they may suffer more than others from problems of nutrient deficiency and they may as well suffer from problems of abundance, so that deficiency anemia and obesity can co-exist in the same population.

Nutritional intervention under conditions of scarcity is easy to envisage, in principle. All that is required is availability of adequate resources. This may, of course, be an impossibility in certain parts of the world. Since nutritional intervention in this situation means that nutrients that are not in sufficient supply are provided, intervention can take many forms: food stamps, school lunch, feeding programs for elderly, feeding programs in institutions, fortifications of foods, and micronutrient supplementation. This is not unlike the model of animal feeding. In this case, knowledge is paramount and intervention follows from knowledge.

Clinical treatment of nutritional deficiency diesases, recognition of diseases that arise from nutrient deficiency, or the proper treatment of vulnerable elements of the population, such as under conditions of pregnancy or infancy, by proper nutritional advice would fall into this category.

In all of this, a basic grounding in nutritional science and a knowledge of the interrelationships between food and nutrients, is critical to satisfactory performance. People, after all, eat food not nutrients; the reasons for eating patterns lie beyond nutritional considerations.

Nutritional problems under conditions of abundance, however, are complex both in the nature of the knowledge base and in the means for intervention. Diseases that are exacerbated under conditions of abundance, such as diabetes, hypertension, and arteriosclerosis, have a complex etiology which involves an interaction of heredity and the environment to which the individual is subjected. The environment encompasses more than nutrition: it includes, among others, smoking, exercise pattern, dealing with tension, and other lifestyle variables. Obesity, a factor accelerating and accentuating adult-onset diseases, itself has its origins in a complexity of heredity, socio-economic conditions, and cultural patterns. Therefore, cause-and-effect relationships are never clear. Emphasis shifts with new information. It has become necessary to develop the concept of risk factors for coronary heart disease to explain relationships or to make predictions.

The student who requires hard evidence is somewhat disappointed with the large areas of "gray" in the information base. Yet as a physician, these problems must be faced and explained in the light of incomplete information.

Likewise, intervention by the physician is complex because it is not simply a matter of adding more food to the diet, or certain kinds of foods, or special nutrients. More often this involves an attempt to change lifestyle, and this is difficult to do, indeed. It is questionable whether the physician community alone or any single segment of society alone can do the job. It is a total societal problem involving many disciplines of which medicine is one. A holistic treatment of this problem requires creative interaction between the relevant disciplines. The physician can contribute by dealing in an informed way with the patient, by offering professional advice on matters of policy, and by recognizing the role of other disciplines and seeking cooperative, multidisciplinary approaches to solution of the lifestyle problems.

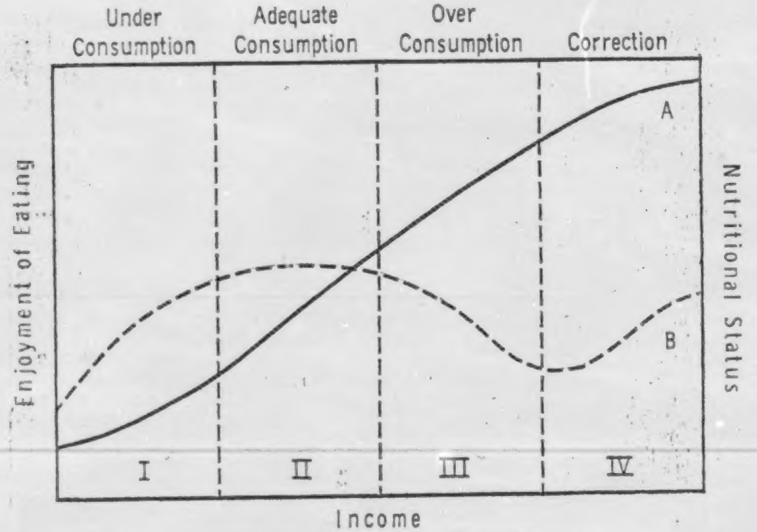
Lack of proper appreciation of the problems of nutrition under conditions of relative abundance can lead the physician to offer unrealistic advice or to withdraw from the area leaving it to lay groups and self-treatment.

I view the field of preventive medicine as the area of greatest challenge and opportunity for nutrition in the United States. Therefore, I would hope that nutrition education would include within its objective the presentation of both the knowledge base and the state of intervention regarding nutritional problems under conditions of abundance with continual reevaluation of the role of the physician as the knowledge improves and experience in intervention progresses. The student must know the opportunities and limitations of nutrition in this area. The student must have a realistic notion of what can and cannot be done.

There is no room for an exaggerated view of what nutrition can do. It is this exaggeration of the virtues of nutrition that has led to unprecedented faddism, to self medication, and the proliferation of the widest variety of diets to cure almost every ill. It is a cruel deception to practice on sufferers from disease.

I would hope that more resources will be made available for nutrition education in medical schools. I would urge, particularly, that such programs include pilot tests of the education process and its consequences in selected medical schools where programs are now ongoing. As we support the general idea, we should seek dynamic curriculum development and provide for feed-back to insure the best relationship between what we teach and what the physician does with the information.

We have not exhausted by any means the limits of present knowledge of nutrition in terms of what can be done for the health of the population. But the knowledge of the best ways to intervene is not generally available and needs developing to take full advantage of the existing knowledge base.



A speculative description of the socioeconomic influences in nutrition-related health problems. Curve A depicts the effect of personal income on desire for taste, status, and convenience in foods, or for away from home eating—another aspect of convenience. Curve B suggests that good nutrition bears a complex relationship to income.

STATEMENT OF CHARLES E. BUTTERWORTH, M.D., PROFESSOR AND CHAIRMAN, DEPARTMENT OF NUTRITION SCIENCES, UNIVERSITY OF ALABAMA, BIRMINGHAM, ALA.

I am Dr. C. E. Butterworth, Jr., Professor and Chairman of the Department of Nutrition Sciences at the University of Alabama in Birmingham. It is a great privilege to have the opportunity to speak to you about two topics which concern me very deeply: Hospital Malnutrition and Nutrition Education. I beg your indulgence in asking that you allow me to speak as an individual physician and teacher, and not as an official spokesman for any organization. Mr. Chairman, I have submitted for inclusion in the record an article prepared in collaboration with my colleagues, Dr. Roland Weinsier, Mrs. Edie Hunker and Dr. Carlos Krumdieck. I invite you to peruse this at your leisure. It is scheduled for publication in a forthcoming issue of the American Journal of Clinical Nutrition. As far as I know, this is the only prospective study on this subject. To summarize briefly, we examined 8 indicators of nutrition status in 134 consecutive patients at the time of admission to the hospital for a medical illness and at frequent intervals thereafter. A clear pattern of deterioration was demonstrated among 6 of 8 nutrition indices during the hospitalization. More significant perhaps was the observation that fully three-fourths of the patients with a normal test at the time of admission had an abnormal result for the same test at the time of discharge, transfer, or death.

We were surprised to find 5 subjects among 108 tested with unrecognized or incipient scurvy, as reflected in extremely low levels of vitamin C in the blood (serum), when they first came into the hospital. However, the most serious problem is undoubtedly the syndrome of protein-calorie malnutrition (PCM). This disorder is life-threatening because it is associated with poor wound-healing and increased susceptibility to infections. There is now widespread agreement that PCM occurs in 25 to 50 percent of all patients hospitalized for longer than two weeks. There can be no doubt that PCM increases the rate of complications and prolongs the hospital stay. No one knows exactly how much of this is preventable or treatable; I would guess at least half of it.

According to the American Hospital Association there were approximately 36,000,000 admissions to the U.S. hospitals in 1976. I estimate that at least 2,000,000 persons suffered last year from hospital malnutrition and that most of it was either unrecognized or inadequately treated.[1] Time does not permit a detailed analysis of the causes of the present deplorable situation, but I would like to suggest that much greater emphasis is needed on nutrition education in Schools of Medicine, Dentistry and Allied Health. There is also a need for improvement in diagnostic methodology and the system of delivering nutrition support services. With current total expenditures for hospital care running above $60 billion annually, an opportunity exists to bring about enormous savings by preventing or shortening hospital admissions through improved nutrition services.

Now in the remaining time I would like to present a few slides [showing some representative examples of clinical problems and some summary statistical data].

Slide 1: Tabulation of body weights and nutritional data in a 19 year old male who had lost 45 lbs of body weight in 26 days following skull fracture sustained in a motorcycle accident; diagnosis: PCM.

Slides 2, 3, and 4: Buttocks and sacral area showing progressive recovery of fat and muscle over a 3-month period; note healing of decubitus ulcer with appropriate nutrition support.

Slide 5: A 65-year-old patient following elective surgery for cancer. Lived alone, had no teeth. No intake of fresh or raw fruits or vegetables for many months. Extensive hemorrhage at surgery. Diagnosis of scurvy confirmed by blood analysis. Patient died 10 days later. Official death certificate makes no mention of either scurvy or cancer.

Slide 6: Chart showing substandard and depleted values for 8 indicators of nutrition status among 134 consecutive patients at the time of hospital admission.

Slide 7: Chart showing frequency of developing abnormal test result among those having a normal test at the time of admission.

---

[1] This estimate assumes that only 10 percent of patients admitted remain for more than two weeks and that half of these have a clinically significant nutritional deficiency. The actual figure could well be higher. This does not include persons in nursing homes or or other types of extended care facilities.

Slide 8: Chart comparing length of hospital stay and mortality rates among patients with high composite scores versus low composite scores on tests for malnutrition.

To conclude, I would like to state that I believe hospital malnutrition is a serious national problem affecting some 2 million persons annually. There is an urgent need to improve the quantity and quality of Nutrition Education for health professionals at all levels. This would constitute only an essential first-step in the long-range solution of a complex problem. I am convinced that Federal expenditures in this area would be cost-effective, by reducing the length of hospital stay, and in some cases perhaps by eliminating entirely the need for costly hospitalization.

"Our findings suggest that little attention is being given to the nutritional state of these very ill patients. Whatever else is done to draw attention to this situation, we, like others, suggest that greater emphasis on nutrition is required in the medical curriculum."

G. L. Hill, et al., Lancet *1:* 689, 1977 (March 26)

[The following material was supplied by Dr. Butterworth, see p. 6 for his oral testimony.]

HOSPITAL MALNUTRITION: A PROSPECTIVE EVALUATION OF GENERAL MEDICAL PATIENTS DURING THE COURSE OF HOSPITALIZATION

(By Roland L. Weinsier, M.D., Dr. P.H., Edie M. Hunker, R.N., Carlos L. Krumdieck, M.D., Ph. D., and C. E. Butterworth, Jr., M.D., Department of Nutrition Sciences, Schools of Public and Allied Health, Medicine, and Dentistry, University of Alabama in Birmingham, Birmingham, Ala.)

ABSTRACT

Nutrition status was evaluated in 134 consecutive admissions to a general medical service and throughout hospitalization among patients hospitalized two weeks or longer. Likelihood of malnutrition (L.O.M.) was determined using eight nutrition-related parameters: serum folate and vitamin C, triceps skinfold (TSF), weight/height, arm muscle circumference (AMC), lymphocyte count, serum albumin, and hemotocrit. On admission 48 percent of patients had a high L.O.M., which correlated with a longer hospital stay (20 days *vs* 12 days for patients with a low L.O.M.) and an increased mortality rate (13 percent *vs* 4 percent). L.O.M. increased with hospitalization in 69 percent of patients with paired determinations. Compared to admission, at final follow-up a greater proportion of patients fell into the depleted range of values for folate, TSF, weight/height, AMC, lymphocyte count, and hemotocrit. These parameters worsened in over 75 percent of patients admitted with normal values. Hematocrit fell in all patients with normal admission levels.

These findings demonstrate an association between nutrition status and hospital course and a worsening trend during hospitalization. Although the data suggest suboptimal nutrition support, such a conclusion awaits evidence of reversal of this trend.

INTRODUCTION

Nutrition surveys in the United States and England have documented the existence of malnutrition among hospitalized patients [1–7]. One report concluded that 44 percent or more patients on a general medical service had protein-calorie malnutrition as evidenced by the presence of one or more substandard nutrition parameters [4]. Other studies indicated that hypovitaminemia occurred commonly among hospitalized patients [1,5]. Inferences drawn from such studies have been that nutrition support is neglected [2,3,6], that little attempt is made to reverse malnutrition [4], and that physicians lack concern for the nutritional status of their patients [7]. Although some reports have suggested that malnutrition actually develops during the course of hospitalization [2,6], there have been no prospective studies to indicate whether the reported prevalence of malnutrition is, in fact, hospital-related or simply a reflection of the status of patients upon hospital admission.

It was the intent of this study to answer the following questions: (1) Does the nutrition status of medical patients deteriorate over the course of their hospitalization? and, (2) Does malnutrition adversely affect the hospital course? To these ends we estimated likelihood of malnutrition on the basis of eight nutrition-related parameters in patients on admission to and throughout the hospital course on a general medical service, and compared nutrition status with the length of hospital stay and mortality rate.

MATERIALS AND METHODS

The nutrition status of 134 consecutive admissions to a teaching hospital general medical service was assessed during a 15-week period in July–October, 1976. The mean age of the patient population was 52 years; 50 percent were male; approximately 33 percent were caucasian and 66 percent black. Essentially all patients admitted to this service were felt to have a serious illness of either an acute or chronic nature. Common admitting problems were congestive heart failure, pulmonary infection, gastrointestinal bleeding, pancreatitis, altered mental status, urinary tract infection, and renal insufficiency. Patients were examined for serum vitamin levels, anthropometric measurements, hematologic and serum albumin values within approximately 48 hours of admission. Not every parameter was obtainable or usable on all patients. Among those patients still hospitalized two weeks after admission, nutrition status was re-examined on a weekly basis and/or several days before discharge, transfer, or death. In order to relate the findings to a single clinical service, patients transferred from the medical service were no longer followed. It was expected that significant changes in most nutrition parameters would not be detectable in less than 2 weeks.

Each admission and follow-up patient was interviewed, examined, and weighed, and a fasting blood sample taken for analysis of serum folate (by microbiological assay with *Lactobacillus casei*) [8] serum vitamin C (by the method of Roe and Kuether [9]). Serum albumin (determined by cellulose acetate electrophoresis), absolute lymphocyte count, and hematocrit are routinely obtained on admission and were re-ordered for the purpose of this study only if unavailable on the follow-up chart. In cases of obvious hemoconcentration the hematocrit value used was obtained after 24–48 hours of rehydration.

Triceps skinfold (TSF) was measured using Lange calipers, taking the average of three readings at the mid-arm. Follow-up measurements were obtained on the same arm. Skinfold data were not used if edema of the arm was present. The mid upper arm circumference (AC) was measured with the arm straight, relaxed, and the arm muscle circumference (AMC) calculated using the standard formula [10]: $AMC = AC - \pi\,(TSF)$. Standing height was measured whenever possible and asked of the patient when not. Body weight measurements were not used if edema was apparent in any area of the body, and arm muscle circumference data were not used if the patient had or developed arm paresis or paralysis.

The guidelines used for standard and substandard values of serum folate, serum vitamin C, serum albumin, and hematocrit were taken from the monograph. Laboratory Tests for the Assessment of Nutritional Status by Sauberlich *et al* [11] and are given in Table I. These guidelines are based on data compiled from published experimental studies and large population surveys. The values chosen for vitamin C correspond to the latest revision according to studies of experimental scurvy in humans referred to in this monograph. Lymphocyte count was related to standard guidelines [12]. Standard values for triceps skinfold thickness and arm muscle circumference were based on generally accepted survey criteria [10], and weight/height standards were adapted from Metropolitan Life Insurance data [13], choosing as a "desirable" body weight the lower range of the medium frame category, adjusted to height without shoes. Established criteria for substandard categories of these anthropometric measurements are not available; hence, arbitrary levels were taken for this study on the basis of our clinical experience (Table I).

In an attempt to objectively estimate a patient's likelihood of being malnourished, or becoming malnounrished during hospitalization, a scoring system was established based on the eight individual parameters of nutrition status. As listed in Table 2, the parameters were divided into three point-categories—major (25 points), intermediate (10 points), and minor (5 points). The greater the point value, the greater the likelihood of malnutrition. Those parameters felt to be both specific and sensitive indicators of malnutrition were weighted most heavily. For example, a serum vitamin C level within the scorbutic range [14], an anthropometric measurement identifying severe wastage of fat or muscle mass [10], and significant lympopenia with hypoalbuminemia to suggest protein deficiency [15] were defined as major criteria for identifying a high likelihood of malnutrition (L.O.M.). A low vitamin C level was weighted more heavily than a low serum folate level on the basis of ascorbate's shorter time course to development of pathologic changes [14,16] and its more evident clinical relevance (e.g. in wound healing and responsiveness to infection). Hematocrit was also given lesser weight, being a sensitive but relatively nonspecific indicator malnutrition. In establishing the point-value criteria, various theoretical combinations of the parameters at different levels were examined by three of us (RW,CK,CB) to see if the L.O.M. score matched our clinical impression. An L.O.M. score was only calculated for patients who had at least seven of the eight parameters available, a missing parameter being scored as if it were normal.

RESULTS

Data were collected on 134 consecutive medical admissions. Of these, 44 (33 percent) remained in the hospital 2 weeks or longer and had followup evaluations. Among the 44 followup patients, 27 (61 percent) were ultimately discharged, 10 (25 percent) were transferred to another service, and 7 (16 percent) died.

Nutrition status evaluation on admission revealed that 48 percent of the patients entered the hospital with a high likelihood of malnutrition (L.O.M.) (Fig. 1). A low serum folate was the most common finding, occurring in 69 percent of patients. The admission profile of patients hospitalized two weeks or longer was very similar to that of the general admission population, other than displaying an increased proportion with a high L.O.M. (62 percent *vs* 48 percent) and a severely depressed albumin level (35 *vs* 10 percent) (Fig. 2). On final followup there was a rise in the proportion of patients showing a substandard or depleted level of all nutrition related parameters except vitamin C and albumin.

Statistical analysis of the changes in each parameter, from admission to final followup, was done using paired data and the one-tailed t-test, taking as the null hypothesis that patients should stay the same or improve in nutrition status during hospitalization. Results showed a significant deterioration in triceps skinfold (TSF), weight, arm muscle circumference, lymphocyte count, and hematocrit (all $p<.01$). The net improvement in serum vitamin C level was significant at the $p<.05$ level.

Nutrition status worsened with hospitalization (as an increase in L.O.M. score) in 69 percent of followup patients, with six of the eight parameters showing a decline in over 50 percent of cases (Fig. 3). The same six parameters (folate, TSF, weight, AMC, lymphocytes, and hematocrit) worsened in over 75 percent of followup patients with normal admission values (Fig. 4). Serum folate fell an average of 48 percent from the normal admission value, weight fell an average of 4.9 Kg, and hematocrit fell an average of 25 percent during the hospital course. Interestingly, hematocrit showed a decline in every patient entering the hospital with a normal level (Fig. 4).

Removing patients with bleeding from the data analysis did not appreciably alter the frequency of anemia described in the admission or followup population. On the basis that increased erythropoesis with chronic blood loss might affect the serum folate level, the following data are noted: The mean folate level of patients admitted with evidence of bleeding was similar to that of the total admission population (5.60 ng/ml and 5.70 ng/ml, respectively). Further, no association was found between declines in hematocrit and declines in folate level during the course of hospitalization.

To evaluate the relationship between nutrition status and hospital course, all admission patients with a high L.O.M. (47 cases) were compared with those having a low L.O.M. (52 cases) in terms of length of hospital stay and mortality rate. A high L.O.M. was found to correspond to a significantly longer hospital stay (20 days *vs* 12 days, $p<.05$) and an increased mortality rate (13 percent *vs* 4 percent, $p=.10$) (Fig. 5). Of note were the findings that serum albumin and hematocrit, when severely substandard, stood out as being closely associated with a prolonged hospital stay (t-test, $p.<.05$), while a substandard TSF and weight/height stood out as highly associated with an increased mortality rate (x^2 test, $p<.01$). The significance of the correlation between calorie reserves, as measured by TSF, and mortality rate was retained even when patients with cancer were removed from the evaluation.

DISCUSSION

Eight parameters were selected in this study for evaluation of nutrition status of hospitalized patients. Serum folate and vitamin C were chosen as representative vitamins likely to be specific indicators of nutrition support. Triceps skinfold (TSF) was used as an indicator of calorie reserves (10,17), being easily determined and also a specifically nutrition-related parameter. Arm muscle circumference has been shown to reflect mass of muscle protein (10,17), which is rapidly mobilized when calorie intake is inadequate (18.19). Weight/height was used as another basic, yet complementary, measure of calorie support [10,17]. In an attempt to heighten specificity of the three anthropometric measurements, cut-off levels for severe and moderate substandard values were chosen below those previously reported [3,4,7]. As shown in Table 1, severe depletion was defined by a TSF less than 20 percent of standard, weight/height less than 80 percent of standard, AMC less than 60 percent of standard. These criteria would be compatible with a clinical picture of extreme muscle-fat wastage of the marasmic type.

Lymphopenia has been associated with impaired cell-mediated immunity [20]. Although affected by other factors, nutrition deprivation is one evident cause of a decreased lymphocyte count [15] and heightened susceptibility to infection [21]. Hypoalbuminemia has been shown to be a key diagnostic feature of protein-calorie malnutrition, heralding the critical clinical and biochemical phase of kwashiorkor [22]. As with lymphocyte count, a low serum albumin can have multiple causes, although inadequate protein intake among hospitalized patients has been associated with a rapid drop in albumin level [15]. Lastly, hematocrit was included on the basis that it reflects multiple nutrient deficiencies [23] and is generally available on the records of hospitalized patients.

It was not the purpose of this study to try to categorize the multiple forms of malnutrition that may occur among hospitalized patients. Rather, the eight parameters were used as measures of adequacy of nutrition support and as detectors of likelihood of malnutrition. Recognizing the limitations of each of the parameters in detecting a malnourished patient, a weighted combination of vitamin, anthropometric, and routine laboratory values was used in an attempt to assess overall likelihood of malnutrition (L.O.M.) (Table 2). The establishment and application of such a scoring system is frought with problems and invites criticism. However, it permits the objective and simultaneous evaluation of several variables generally accepted as indicators of nutritional status.

On admission just under 50 percent of the patient population was categorized as having a high L.O.M. (Fig. 1). The most common measured abnormality was that in serum folate, with approximately 70 percent of patients having a substandard level and approximately 30 percent having a deficient level. Five of 108 admission patients were found to have serum vitamin C levels within the scorbutic range (less than 0.2 mg/dl) [14]. Among those patients hospitalized 2 weeks or longer, the trend was toward an increasing proportion of patients falling into a substandard or depleted category for six of the eight nutrition parameters, with 69 percent of patients having a high L.O.M. at time of final followup (Fig. 2). Excluding from this evaluation patients that died, 73 percent [8/11] were transferred or discharged from the service having a high L.O.M.

The large percentage of patients showing declines in each of the nutrition parameters in Fig. 3 raises the critical question of whether patients receive inadequate nutrition support or if the parameters worsen regardless of nutrition support on the basis of the underlying disease process or necessary hospital practices. To this question it is noteworthy that even among followup patients with normal admission values there was an evident trend toward deterioration (Fig. 4). For example, of patients admitted with normal subcutaneous fat stores according to TSF measurements, 80 percent showed a decline, indicating consumption of endogenous calorie reserves. None of these patients had cancer or were being treated for obesity as explanations for the loss of calorie reserves. Declines in body weight (averaging almost 5 Kg) and in arm muscle circumference both support this finding. With the availabilty of newer techniques of nutrition support such as chemically-defined diets, tube feedings, total parenteral nutrition, and intravenous lipid emulsions it would seem possible to minimize, if not obviate, such calorie deficits.

Serum albumin levels fell in 47 percent [8/17] of the followup patients and in 67 percent [4/6] of patients with normal admission values, declining an average of 0.4 g/dl (Figs. 3, 4). In the well-designed studies of Hoffenberg *et al.*

[24], normal subjects on protein-deficient diets had a mean fall in serum albumin of 0.3 g/dl, reflecting a total body albumin loss of about 43g. There was a non-nutritional explanation for the declining albumin level in only two of our patients (e.g. liver failure, proteinuria, or protein-losing enteropathy). Although it cannot be deduced that the remainder were necessarily protein deprived, evidence clearly suggests that an early effect of protein deprivation is reduced albumin synthesis and hypoalbuminemia [24, 25], and, conversely, that a low serum albumin level is a useful indicator of protein inadequacy [26].

It was an interesting and unexpected finding that in the majority of cases folic acid levels worsened whereas vitamin C levels improved (Figs. 3, 4). In light of the widespread use of multi-vitamin supplements in this hospital population, these findings would seem incongrous. However, most multi-vitamin formulations contain vitamin C but no folate, and some commonly used drugs contain vitamin C as a preservative or buffer (e.g. parenteral tetracyclines contain 300–2,000 mg per dose). If, in fact, the improvement in vitamin C status reflects the nutrition support given during hospitalization, then the deterioration in folate could well signify the need for better understanding of the total nutrition requirements of patients.

Hematocrit fell in 65 percent of all followup patients and in 100% of patients entering the hospital with normal values; over 90 percent were anemic on final followup in contrast to 67 percent on admission. An obvious contributory factor to these changes must be the volume of blood required for laboratory tests. On the other hand, chronic blood loss, as in hemolytic disease, can result in a six-to-eight fold increase production of red cells with maintenance of a normal hematocrit (27). On the basis that average daily hemoglobin production is 6.25 grams, chronic blood sampling of as much as 160 cc per day would theoretically be compensated by only a four-fold increase in red cell production, as long as necessary nutrients are available (namely iron) and synthetic mechanisms are intact. [27]. What contributory effect the unavailability of nutrients might have had on the observed declines in hematocrit cannot be determined from our data.

As shown in Fig. 5, the presence of a high likelihood of malnutrition on admission portended a longer hospital stay and a greater risk of dying. A point that can be raised is whether a patient with a high L.O.M. is simply a patient with a more serious illness and its accompanying risks. On the other hand, it is probably a reasonable assumption that nutrition status affects, as well as reflects, diseases of essentially every organ system in the body. Thus, regardless of severity of illness, recognition of patients with a high likelihood of malnutrition may be important in directing the therapeutic approach so as to avoid a potentially prolonged or downward hospital course.

IMPLICATIONS

The results of this study indicate that a large proportion of patients hospitalized for two weeks or longer incur losses of subcutaneous fat, weight, and muscle mass, along with declines in hematocrit, serum albumin, and serum folate levels. We do not believe that these findings are unique to this institution. The types of patients admitted and the quality of care provided is likely to be representative of most teaching hospitals in this country. Indeed, the growing list of publications from elsewhere suggests a similar pattern would be observed in many other institutions.

Large teaching hospitals tend to be the "last resource" and to receive seriously ill patients. Those patients staying two weeks or longer are likely to be the sickest. In such a population, it is possible that both nutritional and non-nutritional parameters of health may deteriorate despite optimal care. Ideally, however, one would hope that as many indices of health as possible would be better on [illegible]arge than on admission.

It is not possible on the basis of the present findings to assess the relative role of inadequate nutrient intake as opposed to increased nutritional requirements imposed by disease. Nor can the possibility be excluded that the observed changes represent physiological adaptions that may even be beneficial in certain situations. Nevertheless, it is a generally accepted principle of medical practice to seek to normalize abnormal findings. It would therefore seem prudent, until proven otherwise, to attempt to maintain nutrition parameters within normal ranges in an effort to reduce the duration of hospital stay and lower mortality rates.

While the present study documents a downward trend in nutritional parameters during hospitalization, and an apparent increase in mortality rate and length of hospitalization with malnutrition, it remains to be seen if these findings will be altered by nutritional intervention.

REFERENCES

1. Bollet, J. B., S. Owens. Evaluation of nutrition status of selected hospitalized patients. Am. J. Clin. Nutr. 26 : 931, 1973.
2. Prevost, E. A., C. E. Butterworth, Jr. Nutritional care of hospitalized patients. Clin. Res. 22 : 579. (abs), 1974.
3. Bistrian, B. R., G. L. Blackburn, E. Hallowell et al. Protein status of general surgical patients. JAMA 230 : 858, 1974.
4. Bistrian, B. R., G. L. Blackburn, J. Vitale et al. Prevalence of malnutrition in general medical patients. JAMA 235 : 1567, 1976.
5. Leevy, C. M., L. Cardi, F. Oscar et al. Incidence and significance of hypovitaminemia in a randomly selected municipal hospital population. Am. J. Clin. Nutr. 17 : 259, 1965.
6. Hill, G. L., I. Pickford, G. A. Young et al. Malnutrition in surgical patients. An unrecognized problem. Lancet 1 : 689, 1977.
7. Yates, B., S. A. Lopez, S. Jackson. Nutrition status of hospitalized patients. Clin. Res. 25 : 20 (abs), 1977.
8. Herbert, V. Aseptic addition method for *Lactobacillus casei* assay of folate activity in human serum. J. Clin. Pathol. 19 : 12, 1966.
9. Roe, J. H., C. A. Kuether. The determination of ascorbic acid in whole blood and urine through the 2,4,-dinitrophenylhydrazine derivative of dehydroascorbic acid. J. Biol. Chem. 147 : 399, 1943.
10. Jelliffee, D. B. The Assessment of the Nutritional Status of the Community. Geneva, World Health Organization Monograph Series No. 53, 50, 1966.
11. Sauberlich, H. E., R. P. Dowdy, J. H. Skala. Laboratory Tests for the Assessment of Nutritional Status. Cleveland, CRC Press, Inc., 1976.
12. Daland, G. A., S. M. Shea, W. H. Baker et al. Methods for the study of the morphology of blood, Syllabus of Laboratory Examinations in Clinical Diagnosis. Edited by L B. Page, P. J. Culver, Cambridge, Harvard University Press, 71, 1966.
13. Build and Blood Pressure Study. Society of Actuaries, Chicago, 1959.
14. Hodges, R. E., J. Hood, J. E. Canham et al. Clinical manifestations of ascorbic acid deficiency in man. Am. J. Clin. Nutr. 24 : 432, 1971.
15. Bistrian, B. R., G. L. Blackburn, N S Scrimshaw et al. Cellular immunity in semistarved states in hospitalized adults. Am. J. Clin. Nutr. 28 : 1148, 1975.
16. Herbert, V. Biochemical and Hemotologic lesions in folic acid deficiency. Am. J. Clin. Nutr. 20 : 562, 1967.
17. Committee Report. Assessment of protein nutrition status. Am. J. Clin. Nutr. 23 : 807, 1970.
18. Drenick, E. J., M. E. Swendseid, W. H. Blahd et al. Prolonged starvation as treatment for severe obesity. JAMA 187 : 100, 1964.
19. Gamble, J. L. Companionship of water and electrolytes in the organization of body fluids. Lane Medical Lectures, Stanford University Press, 74, 1951.
20. Stiehm, E. R., A. J. Ammann, E. V. Barnett et al. Diseases of cellular immunity. Ann. Intern. Med. 77 : 101, 1972.
21. Law, D. K., S. J. Dudrick, N. I. Abdou. The effects of protein calorie malnutrition on immune competence of the surgical patient. Surg. Gynecol. & Obstet. 139 : 257, 1974.
22. Whitehead, R. G., W. A. Coward, P. G. Lunn. Serum-albumin concentration and the onset of kwashiorkor. Lancet 1 : 63, 1973.
23. Davidson, S., R. Passmore, J. F. Brock. Human Nutrition and Dietetics. Fifth ed. Baltimore, Williams and Wilkins Company, 422, 1972.
24. Hoffenberg, R., E. Black, J. F. Brock. Albumin and γ-globulin tracer studies in protein depletion states. J. Clin. Invest. 45 : 143, 1966.
25. Kirsch, R., L. Frith, E. Black et al. Regulation of albumin synthesis and catabolism by alteration of dietary protein. Nature 217 : 578, 1968.
26. Waterlow, J. C. The Assessment of protein nutrition and metabolism in the whole animal, with special reference to man. Mammalian Protein Metabolism, 3 : Edited by H. N. Munro. New York, Academic Press, 325, 1969.
27. Crosby, W. H., J. H. Akeroyd. The limit of hemoglobin synthesis in hereditary hemolytic anemia. Am. J. Med. 13 : 273, 1952.

TABLE 1.—TABLE OF STANDARD VALUES

	Substandard		Standard	
	Severe	Moderate	Male	Female
Vitamins:				
Serum folate	<3.0 ng/ml	<6.0 ng/ml	≥6.0 ng/ml.	
Serum vitamin C	<0.2 mg/dl	<0.3 mg/dl	≧0.3 mg/dl.	
Anthropometrics:				
Triceps skinfold	<20 percent standard	<60 percent standard	12.5 mm	16.5 mm.
Weight/height	<80 percent standard	<90 percent standard	([1])	([1]).
Arm muscle circumference	<60 percent standard	<80 percent standard	25.3 cm	23.2 cm.
Routine lab:				
Lymphocytes	<1,200/mm^3	<1,500/mm^3	≥1,500/mm^3.	
Serum albumin	<2.8 g/dl	<3.5 g/dl	≧3.5 g/dl.	
Hematocrit (percent)	M<37; F<31	M<43; F<37	≥43	≥37.

[1] See the following table:

Height (centimeters)	152	155	157	160	162	165	167	170	172	175	178	180	183	185	188
Weight (kilograms):															
Male	52	54	55	56	58	59	61	63	65	66	68	70	72	74	76
Female	49	50	51	53	55	56	58	60	62	64	65	67			

TABLE 2.—LIKELIHOOD OF MALNUTRITION (LOM)—ASSESSMENT CRITERIA [1]

	Major (25 points)	Intermediate (10 points)	Minor (5 points)
Vitamins:			
Serum folate		<3.0 ng/ml	<6.0 ng/ml.
Serum vitamin C	<0.2 mg/dl	<0.3 mg/dl	
Anthropometrics:			
Triceps skinfold [2]	<20 percent standard	<60 percent standard	
Weight/height [2]	<80 percent standard	<90 percent standard	
Arm muscle circumference	<60 percent standard	<80 percent standard	
Routine lab:			
Lymphocytes	<1,200/mm^3 + <2.8 g/dl	<1,200/mm^3	<1,500/mm^3.
Serum albumin		<2.8 g/dl	<3.5 g/dl.
Hematocrit (percent)		M<37; F<31	M<43; F<37.

[1] High LOM equals 25 or more points.

[2] Because of overlapping significance, if either parameter was substandard, the other was not counted.

ACKNOWLEDGEMENTS

We are indebted to the following persons who assisted in patient evaluation and data acquisition: Ms. Emily Springer, graduate student in nutrition, Ms. Anne Stafford and Mr. Clay Moquin, medical students at the University of Alabama in Birmingham. We are also appreciative of Dr. T. N. James, chairman, Department of Medicine, University of Alabama in Birmingham, for his cooperation and support in carrying out this investigation.

This investigation was supported by Grant Number 5 R18-CA-17928-01, awarded by the National Cancer Institute, DHEW.

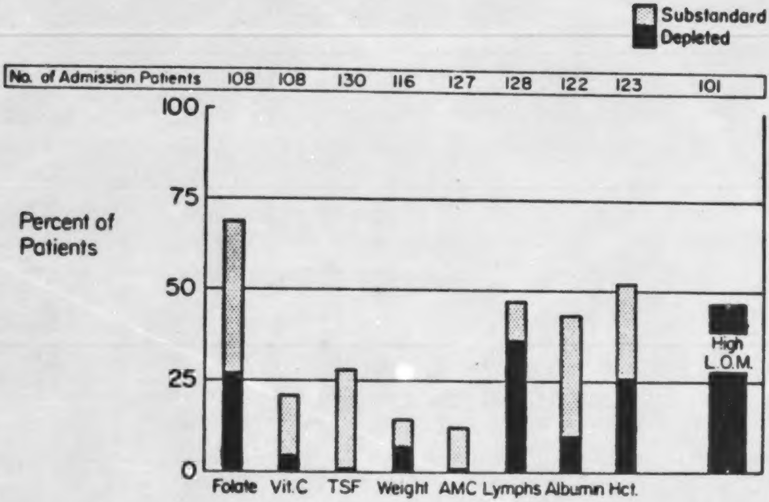


FIGURE 1.—Nutrition status of patients on admission to a general medical service. (TSF=triceps skinfold; AMC=arm muscle circumference; Hct=hematocrit; L.O.M.=likelihood of malnutrition).

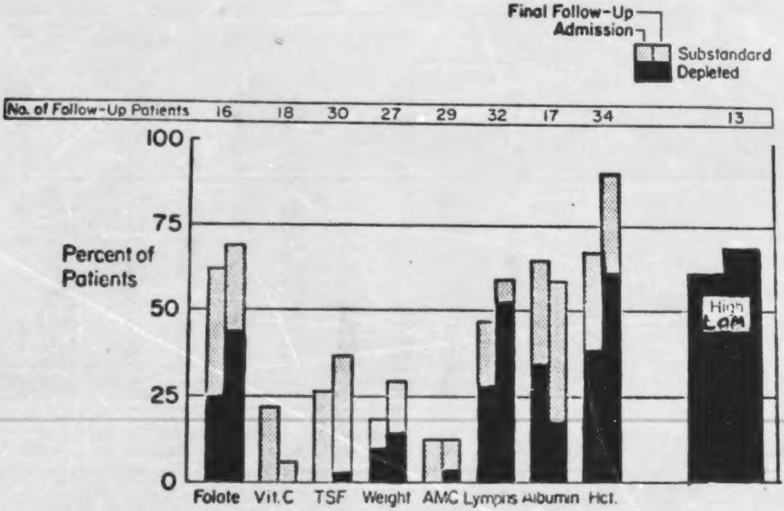


FIGURE 2.—Nutrition status of patients on admission and final followup on a general medical service. (TSF=triceps skinfold; AMC=arm muscle circumference; Hct=hematocrit; L.O.M.=likelihood of malnutrition).

No. of Follow-Up Patients	16	18	30	27	29	32	17	34	13
Average Deterioration in Each Parameter Over Admission	47% (3.1 ng/ml)	30% (0.2 mg/dl)	29% (4.0mm)	7% (4.5Kg)	5% (1.2cm)	32% (660/mm^3)	11% (0.4 g/dl)	20% (8%)	27% (8 points)

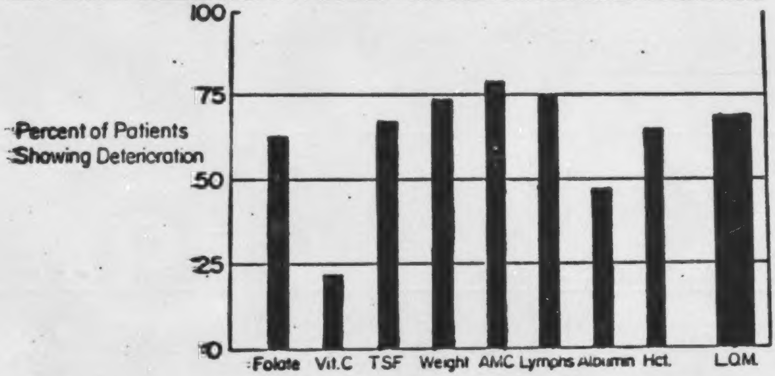


Figure 3.—Deterioration in nutrition status of medical patients hospitalized two weeks or longer. (TSF=triceps skinfold; AMC=arm muscle circumference; Hct=hematocrit; L.O.M.=likelihood of malnutrition).

No. of Follow-Up Patients with Normal Admission Values	6	14	20	22	25	17	6	11	5
Average Deterioration in Each Parameter Over Admission	48% (4.4 ng/ml)	34% (0.2mg/dl)	28% (4.5mm)	7% (4.9Kg)	5% (1.2cm)	34% (870/mm^3)	12% (0.4 g/dl)	25% (11%)	50% (7 points)

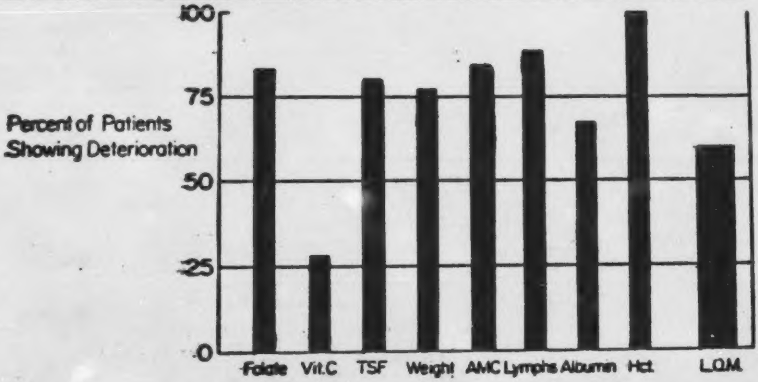


Figure 4.—Deterioration in nutrition status of medical patients hospitalized two weeks or longer, having normal admission values. (TSF=triceps skinfold; AMC=arm muscle circumference; Hct=hematocrit; L.O.M.=likelihood of malnutrition).

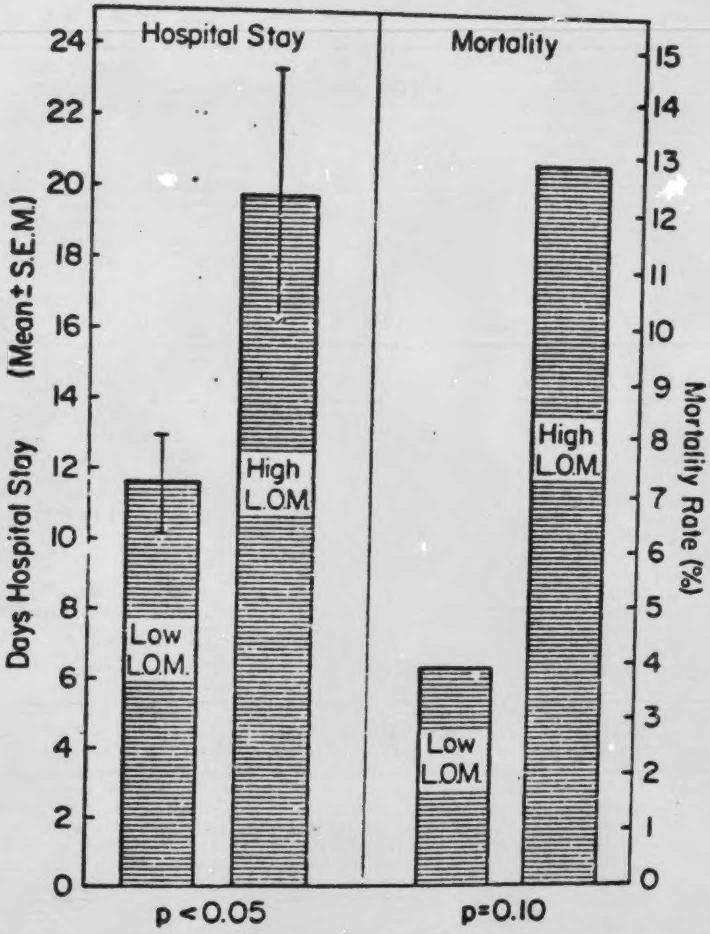


Figure 5.—Likelihood of malnutrition (L.O.M.) at time of admission versus hospital course. Number of patients with a low L.O.M.=52; high L.O.M.=47.

STATEMENT OF ROBERT B. WILSON, D.V.M., PH. D., PROFESSOR AND CHAIRMAN, VETERINARY MICROBIOLOGY AND PATHOLOGY, WASHINGTON STATE UNIVERSITY, PULLMAN, WASH.

INTRODUCTION

This is a brief review of the status of nutrition education in the colleges of veterinary medicine in the United States and a comparison of the state of nutrition education in veterinary medical and human medical schools. Hopefully, the observations, conclusions, and recommendations will generate a more thorough inquiry into some important aspects of this subject.

THE ROLE OF THE VETERINARIAN IN FOOD PRODUCTION FOR PEOPLE

The nation's 33,000 veterinarians play a key role in maintaining our ability to provide food for our ever-increasing population. In addition to protecting the health and productivity of our $60 billion livestock industry, veterinarians care for the Nation's 60 million companion animals and contribute to the understanding and control of human disease through comparative biomedical research.

The most acute food shortage in this country and abroad is of the protein foods, especially those of animal origin. Currently plants provide approximately 70 percent of the world's dietary protein needs, and animals provide 30 percent. The "green revolution" made remarkable strides in increasing world protein production, but it is now clear that plant production alone will not meet the protein needs of the world's increasing population. Land for direct food crop production is limited to approximately 10 percent of the world's land area. Even in the United States, only about 15 percent of agricultural lands are used for direct food crops, with 5 percent being used for industrial crops and 80 percent for production of livestock feeds. Future gains in crops production will come from intensified use of presently cultivated land. Since we have already taken advantage of mechanization and fertilizers, which at their inception were based on "cheap energy," the yield of cereal grains is not likely to increase as rapidly in the future as in the past.

From a nutritional standpoint, it is possible to obtain all of the essential amino acids in proteins needed for human growth from plant sources. However, to do so requires both an adequate knowledge of the selection process and the presence of the right variety of plants and plant products. Fewer plant foods are needed to complete an adequate diet with the inclusion of minimal amounts of animal protein, because animal proteins contain many of the required amino acids.

During the past decade, there has been much concern about the moral implications of feeding grain to livestock. Critics have pointed out that 21 pounds of protein must be fed to beef cattle to produce 1 pound of protein for human consumption. However, those who cite such figures leave much of the story untold. All of the protein required to produce a 400 pound calf, and approximately half of the protein needed to increase a 400-pound calf to a 1,000-pound slaughter animal is, or can be, obtained from feeds unsuited for humans. When one takes into consideration the improvement of protein quality in the passage from plants to animals, the efficiency of protein production is closer to 60 percent than 5 percent. But the most important point is that animals in general, and ruminants (cattle, goats, sheep) in particular, will be important sources of food for people in the future because over half of the earth's land area is unsuitable for crop production but highly suitable for grazing animals.

To take full advantage of the potential of livestock to meet the nutritional needs of the nation and the world, a number of objectives must be accomplished. Chief among these are controlling animal diseases, breeding for disease resistance in animals (as has been done with plants), overcoming malnutrition in animals, and improving methods of production. In the United States, diseases and parasites decrease animal productivity by an estimated 10 percent. However, in many countries of the world with few veterinarians and little commitment to research on animal diseases, losses frequently exceed 50 percent. It is estimated that at least 100 million additional cattle could be grazed in Africa if a single disease, trypanasomiasis, could be eliminated. Although the United States has virtually eradicated eight important animal diseases during the past 100 years, the total annual loss from diseases and parasites is estimated to be over $4 billion per year. The need to expand research efforts designed to reduce this waste is critical.

THE IMPORTANCE OF NUTRITION IN VETERINARY MEDICINE

Thus far we have stressed the importance of animals and animal products in providing food and adequate nutrition for people, but it is also important that animals themselves receive the benefit of adequate nutrition to insure economical production, optimal health and, in the case of companion animals, long lives. Veterinarians must have a working knowledge of nutritional principles for a variety of species. Animals, like people, are affected with many nutritional and metabolic diseases, including protein, mineral and vitamin deficiencies, starvation, and obesity. Although these conditions are important in their own right, perhaps even more important is the interaction of nutritional state and other diseases. For example, protein deficient animals are more susceptible to a variety of infectious agents than are adequately fed animals.

Livestock and pet owners require persons, other than veterinarians, who possess information and expertise pertaining to animal nutrition. Nutritionists at the Ph. D. level in universities, cooperative extension services, and the feed manufacturing industry play a vital role. They are, and should be, the specialists in nutrition. However this cannot, and does not, relieve the veterinarian of the responsibility to have at least a basic knowledge of the principles of nutrition, just as the physician is expected to have more than the layman's understanding of human nutrition.

For the most part, the feed manufacturing industry has provided a valuable service to pet and livestock owners in offering nutritionally sound products, as well as important nutritional education. However, in a few cases where the profit motive has masked nutritional standards, veterinarians and nutritionists have been required to inform the public. One such instance involves misleading advertisements for dog foods which condemn owners for feeding their pets foods containing cereals.

The veterinarian cannot, and should not, be in competition with feed salesmen or professional nutritionists, but he must supervise the nutritional regime for sick animals and, more importantly, determine nutritional programs oriented toward preventative medicine and programmed herd health. Traditionally a veterinary education program is designed to qualify the student to make accurate diagnoses and to institute appropriate treatment. Veterinarians have developed justifiable pride in these capabilities. The traditional veterinarian is likely to feel more rewarded by the diagnosis and treatment of hypocalcemia in a dairy cow than by the outline of a program for dairymen that would reduce the number of hypocalcemic cows to be treated. Something in our psychological makeup lets us enjoy the role of the old family doctor who is always on hand to help out in an emergency, but we seem to find less satisfaction in preventing problems. This is ironic because livestock producers often cannot afford the services of a veterinarian to deal with a single case, but many producers realize that money spent for preventive programs, including nutritional consultation, is cost-effective.

At present the profession is modestly reacting to the demands of modern agriculture by developing programs to train veterinarians in areas most useful to the livestock producer. Examples of these include contract veterinary medicine, nutrition consultation, and programmed herd health. But progress has been painfully slow.

NUTRITION EDUCATION IN VETERINARY MEDICINE

Nutrition education is being provided to veterinary students and to graduate veterinarians in a variety of ways. In a recent survey, we found that colleges of veterinary medicine in the United States are about equally divided in their approaches to nutritional education: one-third require a course in nutrition during the preveterinary curriculum; one-third offer a distinct course in nutrition in the professional curriculum; and one-third utilize an integrated approach by teaching nutrition within the framework of established courses in physiology, pathology and medicine. At least three colleges now have clinical nutritionists on their faculties and others seem to be moving in that direction. The desirability of having such a position on the faculty was often expressed by representatives of several of the schools, as was the need for in-service or continuing education programs in nutrition for the faculty.

Although we found the majority of the faculty at Washington State University are convinced of the inadequacy of nutrition education in the veterinary curriculum, opinions differ markedly on what should be done to correct the deficiencies or the extent to which veterinarians should be educated in matters relating to nutrition.

A study of the content of courses in the Washington State University veterinary curriculum revealed that we are teaching the equivalent of a 3-semester-hour course in nutrition. However, the material is offered in a number of courses rather than in one course devoted solely to nutrition. Often the students do not recognize the nutritionally related material in courses such as physiology and pathology.

I have found much student interest in nutrition education in the two colleges of veterinary medicine in which I have taught (Washington State and Missouri). However, students seem more interested in receiving this education through a case-oriented approach rather than in separate didactic courses on nutrition. Most schools have found that veterinary students want to learn nutrition from veterinarians and not from academic nutritionists, even though the latter might be highly qualified. Courses in nutrition taught the preveterinary or professional curriculum, by nonveterinarians have not usually been successful, partly because of student attitudes and partly because of the relative lack of understanding of the nonveterinarian about the total scope of disease.

I believe that the most satisfactory approach is to have one or more veterinarians, well trained in nutrition, serving as clinical nutritionists in our colleges of veterinary medicine. At least three schools have established such positions, two of them with the assistance of special funding from private sources. These faculty members could not only teach, but also influence course offerings in general, and serve as resource persons to all faculty and students. They would also be well qualified to serve as liaisons between the veterinary faculty and professional nutritionists in other university departments or in industry.

The significant limitation to such a recommendation, however, is the paucity of trained veterinary-nutritionists. Few such individuals have been trained during the past decade, and only a few of these have taken positions in veterinary schools. The establishment of a specific program to train both current and future veterinary faculty in nutrition is critically needed.

Although a number of organizations have made some progress in providing continuing education in nutrition for veterinarians during the recent past, the overall effort has been minimal. Feed manufacturers have offered literature and conferences, and have, to a limited extent, supported research projects. A few papers dealing with nutritionally related subjects are read at the meetings of most major veterinary groups. At the 1977 convention of the American Veterinary Medical Association, 17 papers considered some aspect of nutrition. Unfortunately, during the same year, only four abstracts dealing with nutrition were published in the Journal of the American Veterinary Medical Association, and not a single full-length paper on the subject appeared in that journal in 1977. On the positive side, at least 12 auto-tutorial programs considering veterinary nutrition are available from various libraries.

VETERINARY AND HUMAN NUTRITIONAL EDUCATION

The provision of adequate education in nutrition is a concern shared by veterinary and human medicine, since nutrition education has been an impoverished area in both professions. Traditional approaches to medicine in both professions have emphasized curing rather than preventing disease. Using the scalpel and syringe is considered more heroic than prescribing a specific dietary regimen to prevent disease. In both professions, administrators and faculty sense that something must be done to eliminate the deficiencies in nutrition education, but new faculty positions are scarce, and few training programs exist to retrain current faculty. Students in both professions are generally eager for information concerning nutrition, but they wish this information to be presented in a relevant (in their view) way, using the practical, case-oriented approach. Both professions experience difficuties in defining the appropriate relationships between physicians and veterinarians in nutrition education, and professional nutritionists and dietitians.

In the past, veterinarians may have had a slight advantage over physicians with respect to their education in nutrition, due to their association with animal nutritionists during preveterinary training. In recent years, fewer preveterinary students have taken the traditional animal husbandry courses and some of this advantage has been lost. Medical schools, moreover, seem to be more active than veterinary schools in promoting nutrition education programs and in establishing programs emphasizing clinical nutrition. A good example is the program at the Boston University School of Medicine.

Most professionals in both disciplines would agree that more must be done to prepare our students to deal with problems related to nutrition and nutritionally related diseases.

RECOMMENDATIONS

1. A thorough investigation of the problem of nutrition education in veterinary schools should be conducted.
2. Training programs should be developed at two levels: one level to train present qualified faculty in nutrition; the other level to provide graduate-level training for future veterinary faculty members.

These programs need not be large, but they should be specific and carefully designed to meet the desired goal of providing at least one faculty member in each of the colleges of veterinary medicine with sufficient expertise in nutrtion to act as clinical nutritionist in the manner described previously.

3. There must be increased support for research into animal diseases and problems of production.

Both nutritional problems of animals themselves, and the role of animal and animal products, such as milk and eggs, in the nutrition of man must be studied. Most industries find that it is profitable to designate 5–10 percent of gross sales for research. This is 20 to 40 times the amount spent by state and federal governments for research on animal diseases. In most years, almost twice as much is spent for plant disease research as for animal disease research by the U.S. Department of Agriculture, despite the fact that cash receipts from marketing livestock and livestock products usually run considerably higher than those from plant products. Research efforts into diseases of plants ought to continue, but the great disparity in funding at the federal level should not exist.

4. Continued support must be given for continuing education programs fostered by federal, state and private organizations.

The National Research Council should be adequately supported to provide important information regarding animal nutrition to veterinarians, livestock producers, and owners of companion animals on a broad basis.

STATEMENT OF JOHN I. SANDSON, M.D., DEAN, BOSTON UNIVERSITY SCHOOL OF MEDICINE, BOSTON, MASS.

I am John I. Sandson, Professor of Medicine and Dean at Boston University School of Medicine. I appreciate the opportunity to testify today before your subcommittee on the subject of nutrition education in medical schools.

Nutrition should be one of the most important subjects taught in medical schools yet, during the past several decades, education in nutrition in medical schools has been inadequate. In 1962 it was acknowledged at a conference on Teaching Nutrition in Medical Schools that undergraduate medical teaching was too focused on nutritional deficiency diseases and that the availability of graduate medical education was too limited. In 1973 at a similar conference in Williamsburg, Dr. Butterworth stated, "The health professions have been complacent, passive and oblivious of the proper role of nutrition in health education and in medical practice."

Most physicians deal every day with patients who have nutritional problems. These patients include the very young, the very old, those with acute illnesses, and those with degenerative diseases. Nutritional assessment is important in every patient seen by a physician. Most faculty in medical schools would agree that nutrition is an integral aspect of basic medical science and all the clinical disciplines. Despite these observations, the teaching of nutrition in medical schools is not given high priority and, in fact, is done rather poorly.

Why is this so? Why haven't medical schools done a better job with education in nutrition?

The answer is rather obvious. Nutrition in most medical schools is not recognized as a separate basic science or clinical discipline. Nutrition is taught by many different academic departments—including, but not limited to, biochemistry, pathology, physiology, medicine, pediatrics, and surgery. Each department teaches nutrition from its own narrow perspective, usually not in a comprehensive way, often very highly focused and, worst of all, with very little enthusiasm. There are only one or two medical schools that have departments of nutrition. There are many medical schools that do not have a well planned and well taught curriculum in nutrition. About half of the medical schools still do not have a full-time faculty member who is in charge of nutrition education. Such an individual is critical if education in nutrition is going to be well planned, properly delivered, and effectively evaluated. Unfortunately, in the "give and take" of medical school curriculum planning, without someone in charge—without an advocate, if you will—the curriculum in nutrition may easily fall between the cracks.

The two essential steps needed to establish effective education in nutrition in a medical school are: (1) the designation of a senior faculty person to be responsible for the educational program in nutrition, and (2) the allotment of adequate time in the curriculum for nutrition.

The director of the program, with a lot of input from faculty from all departments, should plan the curriculum to be taught during both the preclinical and clinical years. The curriculum in the preclinical years can be taught either in a relatively short concentrated block of time or by the placement of lectures and seminars throughout the year. During the preclinical years the student must obtain an understanding of digestion, intestinal absorption, metabolism, nutritional requirements for normal growth and development, undernutrition, overnutrition, and diseases of nutrition. During the clinical years the student must learn more about clinical aspects of diseases of nutrition, the dietary management of metabolic and other diseases, and the nutritional aspects of all clinical disciplines, including medicine, surgery, pediatrics, obstetrics, and psychiatry.

The director obviously cannot do everything by himself but he should do a considerable amount of the teaching and see that all of the teaching in the entire curriculum in nutrition is properly coordinated and of the highest quality. In the clinical years the director must be the catalyst to insure that nutrition receives proper emphasis during the various clerkships. The director should participate in key clinical conferences and rounds, and help develop specific rounds and seminars during each clerkship that are oriented especially toward nutrition. It is also very important that medical students understand the impact of psychosocial factors on patients with certain nutritional problems. These factors can be emphasized during appropriate seminars and experiences in community medicine and socio-medical sciences and special assignments in primary care settings away from the teaching hospital, either in this country or abroad.

We are very proud of the educational program in nutrition at Boston University School of Medicine. The curriculum in nutrition has been developed over the past 6 years when a new faculty member was recruited specifically to head the program in nutrition. Nutrition is taught during each year of the 4-year medical school curriculum. During the first year there is a block of 18 hours assigned to nutrition. In this block basic information about nutrition that is needed by every physician is presented, such as the nutritional requirements for normal growth and development, the nutritional requirements of the normal adult, and the requirements for nutrients such as protein and iron in patients with specific diseases. Much of this teaching is developed around case presentations. During the second year there are two blocks assigned to nutrition; one is a block of eight hours given during the pathology course and the other is a block of 16 hours given during the biology of disease course. During the pathology block the student learns the morphologic changes that are specific for certain diseases. The other block is given at the end of the biology of disease course.

Using lectures and case presentations the student is presented with the problems in patient management that are associated with maintaining adequate nutritional support of seriously ill hospitalized patients. The various modalities used to provide proper support for these critically ill patients are explained in detail. Third-year students attended clinical conferences and rounds during which the nutritional aspects of a patient's illness are emphasized. During these conferences the medical history, physical findings, diagnosis, and management are reviewed with particular emphasis given to the nutritional problems of the patient. Fourth-year students can choose clinical or laboratory electives in nutrition. During the clinical elective students are involved in consultation on patients with serious nutritional problems on the medical, pediatric, and surgical services at Boston City Hospital. Students actively participate in resolving difficult diagnostic and management problems with house officers and attending physicians. They carefully follow the course of these patients over a period of several weeks.

The program in nutrition at Boston University School of Medicine has been successful and provides our students with a comprehensive background in nutrition that will serve them well throughout their medical careers.

Nutrition education in many medical schools has been poor because of lack of interest and/or organization. Effective education in nutrition is needed in every medical school. The curriculum needs to involve both the preclinical and clinical years. There needs to be a senior person in charge. An academic structure in nutrition needs to evolve in each medical school. Different schools will undoubtedly evolve different structures—some will have no formal structure, just a committee; others will develop a section, a division, and perhaps someday, in most medical schools full academic departments may develop.

Some legislative action involving nutritional education may prove to be helpful. Medical schools should certainly be encouraged to have someone in charge of the curriculum in nutrition and perhaps to develop an administrative structure in nutrition. There are various approaches that could be used. For instance, the development of an appropriate program in nutrition could be a condition of capitation. Another approach would be to make the development of a curriculum in nutrition a special project under the Health Manpower Law or under a new law. The Liaison Committee on Medical Education, which accredits all medical schools in this country, could also encourage schools to give more emphasis to education in nutrition.

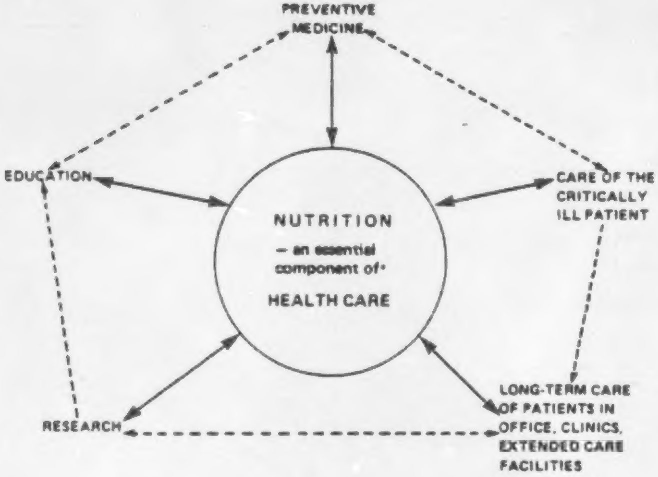
One important aspect of education in nutrition that I have not mentioned is continuing education for physicians. In the past, such education was done in a manner that was largely random and fairly unfocused. With the increased use of medical audit, it is likely that certain shortcomings in patient care in the area of nutrition will become apparent. Continuing education in nutrition can then be directed to the specific educational needs of physicians in this area. If done well, this could lead to a very effective way of quickly improving nutritional education for large numbers of practicing physicians and to an improvement in this important area of health care. Legislation aimed at encouraging and improving continuing education in nutrition would be very useful.

STATEMENT OF ELEANOR A. YOUNG, PH. D., R.D., ASSOCIATE PROFESSOR AND CO-DIRECTOR, DIVISION OF HUMAN NUTRITION, DEPARTMENT OF MEDICINE, THE UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER, SAN ANTONIO, TEX.

Nutrition—an essential aspect of medical education

I. CONCEPTUAL BASIS FOR NUTRITION IN THE MEDICAL CURRICULUM

Realistic, meaningful, and effective medical nutrition education must be solidly rooted in the concept that NUTRITION is an essential component of health care [1–5].


PREVENTIVE MEDICINE
EDUCATION
CARE OF THE CRITICALLY ILL PATIENT
NUTRITION
– an essential component of·
HEALTH CARE
RESEARCH
LONG-TERM CARE OF PATIENTS IN OFFICE, CLINICS, EXTENDED CARE FACILITIES

THE UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER
SAN ANTONIO, TEXAS

This may be viewed from several perspectives, but it is clear that the physician's role in nutrition is one that has various interrelated dimensions.

Preventive Medicine

Surely epidemiological data and basic clinical research clearly indicate a strong association of dietary patterns in the so-called "killer diseases" in our contemporary world, especially in affluent populations such as the United States [6–14]. Discussion regarding the role of nutrition in the major diseases in the U.S. led the Senate Select Committee to propose dietary goals for the U.S. [6].

Physicians as well as other health professionals (dietitians, nurses, pharmacists), are major forces in preventive medicine. It is likely that without support of the medical professional team to achieve specific goals of disease prevention, it would not happen.

In addition, prevention may be the most cost-effective and the best scientific strategy in our conquest of nutrition diseases [15–17].

Education

Physicians are, in most instances, educators. Surely they are direct educators of their patients, and indirectly, their educational influence may reach all segments of society. This potential for nutrition education is no exception.

Nutrition education lags behind education in many other scientific fields, due in large part to minimal financial support. It is not possible to arrive at completely accurate figures, but estimates of combined federal nutrition expenditures in recent years were: $60,187,088, 1974; $63,058,158, 1975; and $68,159,987, 1976. [18]

This is only a fraction of expenditures for U.S. food and beverage advertising. In 1971, combined six media total expenditures were $1,159,522,600 and television expenditures were $890,882,400 [19]. This means that the total federal nutrition expenditures are approximately 6.04 percent of the U.S. public media expenditures for advertisement of foods and beverages.

Analysis of TV content has revealed that a large share (approximately 75 percent) of food and beverage advertisements are for items of little nutritious value (20). The overall impact of positive nutrition education via mass media is much less than it could be [19–21].

In medical schools, one of the primary roles of the faculty physicians is education. They are responsible for planning, implementing, and evaluating the educational program for students and housestaff. The economic cost of the educational component of our medical school is approximately $40,000.00 per student per year. For 114 medical schools in the U.S. graduating 150 students a year, the combined educational cost of a 4-year program of 17,100 students is approximately $2,736,000,000.00. What percentage of the educational budget goes specifically for nutrition education and research is not known. At The University of Texas Health Science Center at San Antonio, approximately 2%–3% of the total budget goes to nutrition education and research. For the U.S. as a whole, it is likely that the average percentage of the medical school budget that goes to nutrition is less than 1 percent.

Research

Major advances in our understanding of nutrition-related disease is derived largely from creative, innovative and well-controlled clinical trials and human metabolic studies. In this way, many physicians, especially those in medical centers engaged in research, contribute significantly to new knowledge of the nutritional aspects of health care. A review of the nutrition-related metabolic studies and clinical trials in leading medical journals provides evidence of the leadership role of physicians in this regard. Therapeutic advances are generated by basic nutrition research [3, 22].

Coupled together, nutrition education and research are likely to be the best prevention of the "killer diseases". The Honorable Fred Richmond has clearly pointed out that nutrition education and human nutrition research are essential steps to achieving a sound National Nutrition Policy [23].

Care of the critically ill patient

It is in the care of the critically ill patient that nutrition may play a truly life sustaining role. With the medical and technological advances of total parenteral nutrition, enteral defined formula diets, and a variety of specially designed supplementary formulas, a much more aggressive approach to provide nutritional support for patients is possible [24–26].

Although medical means of nutritional support are currently available, the application of these methods require greater nutrition knowledge by the physician than was formerly required. These methods allow the physician to provide nutritional support for patients with catabolic response to injury, stress, and infection when the nutritional needs far exceed those required for the healthy person [24, 25]. Patients having trauma, stress, major surgical procedures, or infection are usually hypermetabolic with marked increases in energy expenditure and nitrogen loss. They are usually anorexic or unable to eat. For these patients, total parenteral nutrition and/or the use of defined formula diets may be effective in permitting normal growth and development, positive nitrogen balance, wound healing, and maintenance of the immune system to protect against infection.

Protein-calorie-malnutrition is most frequently seen in this country in hospitalized patients. It has been estimated that 25 percent to 50 percent of patients in the general medical and surgical services of large hospitals demonstrate unequovical signs of protein-calorie-malnutrition [27–30].

Long-term care of patients in office, clinics, extended care facilities

Nutritional support for persons seen as out-patients comprise the overwhelming bulk of direct health care by the physician. The major "killer disease" in the U.S. all have a nutrition component [7–14]. It is not known to what extent nutritional assessment and support are provided for the average out-patient seen in the United States. The prevalence of malnutrition among this patient population is also not known. More to the point, it is not known to what extent malnutrition in the out-patient population is due, at least in part, to the inadequate provision of nutrition support from the physician and/or medical team.

II. SOME POSITIVE FACTORS IN DEVELOPMENT OF A MEDICAL NUTRITION PROGRAM

Some major positive factors in development of an effective nutrition program in The University of Texas Health Science Center medical curriculum at San Antonio include:

1. Recognition and support by administration and faculty.
2. Financial support.
3. Development of clearly defined goals and objectives.
4. Faculty coordinator/director.
4. Visibility of nutrition in the curriculum and at the bedside.
6. Utilization of a variety of approaches.
7. Interdisciplinary approach. The team approach is a positive factor: improving the quality of patient care; broadening the scope of interchange among health care professionals; and stimulating continual education of those involved.
8. Focus on patient oriented teaching in a clinical situation.
9. Nutrition components as a required aspect of the curriculum.
10. Identification and integration of nutrition content in the curriculum.
11. Specific instructional objectives expressed in terms of measurable performance of the student.
12. Nutrition faculty based in a clinical department, e.g. Medicine.
13. Visible nutrition research.
14. Visible community involvement in nutrition-related health matters.

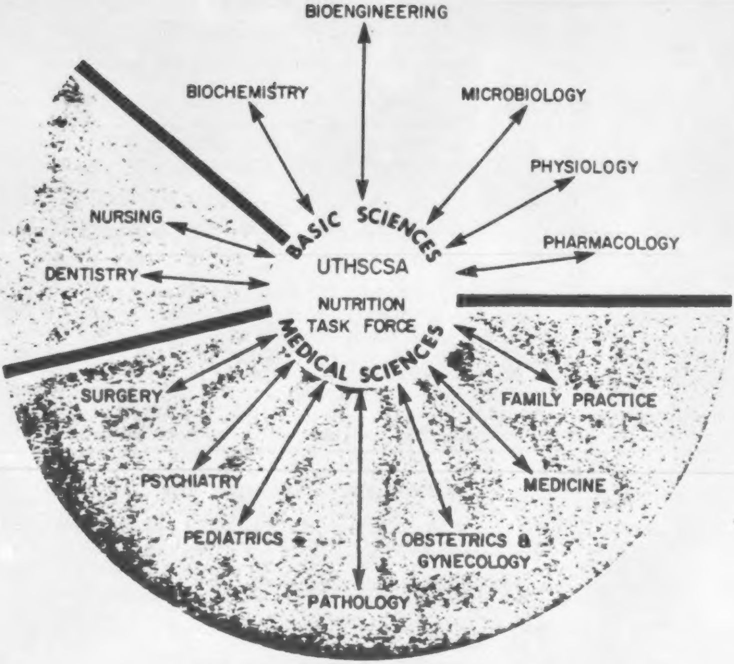
III. AN INTERDISCIPLINARY APPROACH TO NUTRITION EDUCATION

At The University of Texas Health Science Center at San Antonio, a concerted effort to establish an effective nutrition program in the School of Medicine has been developing over the past ten years.

Development of an interdisciplinary Nutrition Task Force has been a major means of maintaining effective communication, planning, and participation with all departments within the health science center.

Members of the Nutrition Task Force participate actively in the development, implementation, and evaluation of a variety of activities:

1. Required nutrition module for second year medical students (for 1978 schedule, see Appendix 1.)
2. Other nutrition-related components in the medical curriculum (see Appendix 2).
3. Nutrition Lecture Series. Seven to ten outstanding, nationally known physicians and/or scientists distinguished for their contributions to nutrition-



related research and/or clinical practice are invited to our school each year. Approximately 3,000 brochures are printed and distributed to all faculty, housestaff, and students within the UTHSCSA. Physicians, nutritionists, and dietitians in the local community of San Antonio are also invited. This series has served to emphasize the importance of nutrition in clinical medicine and its relation to national health problems. This series spotlights nutrition as a recognized and important aspect of medical education (see Appendix 3).

4. Therapeutic Nutrition Luncheon Conferences. A series of six luncheon conferences for all third year students, when on the clinical medicine rotation, are designed to permit a first-hand knowledge of dietary prescriptions. Each conference has a theme relative to a selected disease entity; for example, liver disease, acute renal failure, celiac spru, obesity, lactose malabsorption, etc. A meal typical of that which would be served to the patient is served to the students. Practical aspects of ordering the diet, as well as special characteristics of the diet are discussed by a dietitian. A faculty member then discusses the use of the diet in relation to a specific disease entity.

5. Nutrition-related research. Various members of the Nutrition Task Force are currently engaged in nutrition-related research. In addition, we have been able to support a limited number of students in research projects in one of the on-going investigative aspects of nutrition. These student experiences have been very valuable for indepth nutrition education. The Williamsburg Conference (3) stressed the absolute necessity of nutrition research within the scope of developing a nutrition education program in medical schools. Such opportunities in our program have strengthened the acceptance, participation, and educational value of nutrition as currently offered in our curriculum.

6. Nutrition knowledge pre-test, post-test. Over the past six years we have developed a pre-test, post-test evaluation of the nutrition knowledge of medical students. Such data may enable us to: (*a*) compare nutrition knowledge of new students from one year to the next; (*b*) determine knowledge acquired during the years of medical education; and (*c*) identify areas of needed emphasis.

NUTRITION KNOWLEDGE OF MEDICAL STUDENTS

[1st-year students, pretest]

Year	Students (number)	Mean score (percent)
1973	122	68. 0
1975	125	72. 4
1976	135	60. 1
1977	136	60. 8
1978	199	60. 9

Source: Young, E. A., UTHSC, San Antonio, Tex.

7. Nutrition electives. Nutrition research electives may be selected by the students. Individualized laboratory or clinical projects may be initiated by interested students for elective credit.

8. Continual education conferences. Various members of the Nutrition Task Force have an opportunity of participating in continuing educational conferences. These conferences are available to students, to local physicians as well as to some seventy-three out-reach hospitals with approximately 750 physicians participating (Appendix IV).

9. Clinical support team. We are currently exploring ways to fund a clinical support team. This is not only a great need in our hospital, but would serve a significant educational role for the housestaff and students. To date, we have not been able to financially support such a service.

IV. SOME PROBLEMS ENCOUNTERED IN DEVELOPMENT OF A MEDICAL NUTRITION PROGRAM

1. Funding to support: (*a*) expansion of nutrition faculty; (*b*) development of a clinical nutrition hospital team; (*c*) expansion of dietetic positions for more comprehensive dietary counseling, diet history data, etc.; and (*d*) expansion of nutrition research activities for students.
2. Crowded medical curriculum and competition for time.
3. Development of evaluation methodology.
4. Incorporation of nutritional assessment and management by physician faculty and housestaff as a routine aspect of patient care.
5. Planned way to provide for nutrition as an aspect of ambulatory patient care (out-reach into the community; out-reach into the family).
6. Lack of nutrition as recognized clinical specialty.
7. Integration of the sociological, cultural, psychological, and economic aspects of nutrition with the medical aspects of nutrition.

V. PLANS FOR FUTURE DEVELOPMENT

Some plans for future development include:

1. Collaboration with the UTHSC Dental School, School of Nursing, and School of Pharmacy to develop a strong nutrition component.
2. Development and implementation of the Texas Nutrition Consortium. Currently there is an effort to establish such a Consortium. The principal objective of the Consortium would be to foster the nutrition education of the health professional students enrolled in the universities and colleges of Texas. By linking all of the institutions which have on-going nutrition programs, a mutual strengthening of the individual program will result and a strong and diversified joint program will be available to qualified students. Each institution can bring its resources to provide greater depth in areas of excellence and not divert them toward duplication areas of excellence at other institutions within the Consortium. This would bring distinctive faculties and facilities together in a single educational program that would permit the Consortium to accomplish what a single institution could not accomplish.
3. Development of an effective hospital clinical nutrition program.

A great deal has been achieved in the nutrition education program at the University of Texas Health Science Center at San Antonio, Texas (31), however there is much MORE yet to be accomplished. It is a slow, sometimes a difficult road to follow, but every step is exciting and challenging.

VI. REFERENCES CITED

1. Council on Foods and Nutrition, American Medical Association. Nutrition teaching in medical schools. Report of the Conference on Nutrition Teaching in Medical Schools, Chicopee Falls, Mass., July–August, 1962, J. Am. Med. Assoc. 183:955, 1963.

2. White House Conference on Food, Nutrition and Health. Final Report. Nutrition teaching in medical schools. Government Printing Office, Washington, DC, 1970, p. 1967.

3. White, P. L., L. K. Mahan, and M. E. Moore (Editors). Conference on Guidelines for Nutrition Education in Medical Schools and Post-doctoral Training Programs, Williamsburg, VA, January, 1972, Am. Med. Assoc., Chicago, 1972.

4. Committee V–I, International Union of Nutritional Sciences. Nutrition education in medical facilities. Conference of International Union of Nutritional Sciences, Tunis, January 21–26, 1971, Am. J. Clin. Nutr. 24:1399, 1971.

5. National Nutrition Consortium. Position paper on nutrition in medical education. J. Am. Dietet. Assoc. 65:259, 1974.

6. Select Committee on Nutrition and Human Needs, U.S. Senate. Dietary Goals for the United States. 95th Congress, 1st Session, December, 1977. Washington, DC, U.S. Government Printing Office, No. 052–070–04376–8, 1977.

7. Select Committee on Nutrition and Human Needs, U.S. Senate. Diet Related to Killer Diseases. Diet and Preventive Medicine. Diet and Cancer. July 27–28, 1976. Washington, DC, U.S. Government Printing Office, No. 052–070–03872–1, 1976.

8. Select Committee on Nutrition and Human Needs, U.S. Senate. Diet Related to Killer Diseases, Vol. III. Response to Dietary Goals for the U.S.—Re Meat. March 24, 1977. Washington, DC, U.S. Government Printing Office, No. 052–070–04277–0, 1977.

9. Select Committee on Nutrition and Human Needs, U.S. Senate. Diet Related to Killer Diseases, Vol. VI. Response to Dietary Goals for the U.S.—Re Eggs. July 26, 1977. Washington, DC, U.S. Government Printing Office, Washington, DC, No. 050–070–04280–0, 1977.

10. Select Committee on Nutrition and Human Needs, U.S. Senate. Diet Related to Killer Diseases, Vol. II, Part 1. Cardiovascular Diseases. February 1, 1977. Washington, DC, U.S. Government Printing Office, No. 052–070–03987–6, 1977.

11. Select Committee on Nutrition and Human Needs, U.S. Senate. Diet Related to Killer Diseases, Vol. II, Part 2. Obesity. February 2, 1977. Washington, DC, U.S. Government Printing Office, No. 052–070–04275–3, 1977.

12. Select Committee on Nutrition and Human Needs, U.S. Senate. Diet Related to Killer Diseases, Vol. IV. Dietary fiber and health, March 31, 1977. Washington, DC, U.S. Government Printing Office, No. 052–070–04277–0, 1977.

13. Select Committee on Nutrition and Human Needs, U.S. Senate. Diet Related to Killer Diseases, Vol. V. Nutrition: Mental Health and Mental Development. June 22, 1977. Washington, DC, U.S. Government Printing Office, No. 052–070–04278–8, 1977.

14. Select Committee on Nutrition and Human Needs, U.S. Senate. Diet Related to Killer Diseases, Vol. VII. Nutrition: Aging and the Elderly. September 23, 1977. Washington, DC, U.S. Government Printing Office, No. 052–070–04380–6, 1977.

15. Levy, Robert: Testimony on Diet and Cardiovascular Disease, February, 1977. U.S. Select Committee on Nutrition and Human Needs, Dietary Goals for the United States. Washington, DC, U.S. Government Printing Office, December, 1977, No. 052–070–04376–8, p. XXXIII.

16. Weir, C. E.: Benefits from human nutrition research. In Nutrition and Health, With an Evaluation of Nutritional Surveillance in the United States. Senate Select Committee on Nutrition and Human Needs, December, 1975. Washington, DC, U.S. Government Printing Office, 1975, pp. 67–70.

17. Popkin, B. M.: Economic benefits from the elimination of hunger in America. *In* Nutrition and Health, with an Evaluation of Nutritional Surveillance in the United States. Senate Select Committee on Nutrition and Human Needs. December, 1975, Washington, DC, U.S. Government Printing Office, 1975, pp 71–85.

18. Michelman, K. C.: The role of the federal government in nutrition education. A study prepared by Congressional Research Service. The Library of Congress for the Subcommittee on Domestic Marketing, Consumer Relations and Nutrition of the Committee on Agriculture, U.S. House of Representatives, Washington, DC, U.S. Government Printing Office, March, 1977, pp 20–23.

19. Manoff, R. K.: Potential users of mass media in nutrition programs. J. Nutr. Ed. 5:125, 1973.

20. Masover, L.: The impact of television food advertising. Unpublished thesis, Northwestern University Medical School, Department of Community Health and Preventive Medicine, Chicago, Illinois, 1976.

21. Gussow, J.: TV ads aimed at children. J. Nutr. Ed. 6:48, 1972.

22. Dwyer, J. and M. E. Melitch: Clinical nutrition 1976: Where are we going? Ann Intern. Med. 84:329, 1976.

23. Richmond, F.: Forward to the role of the federal government in nutrition education. A study prepared by Congressional Research Service, The Library of Congress for the Subcommittee on Domestic Marketing, Consumer Relations, and Nutrition of the Committee on Agriculture, U.S. House of Representatives, Washington, DC, U.S. Government Printing Office, March, 1977, p IX–XII.

24. Wilmore, D. W.: The Metabolic Management of the Critically Ill. 1977. New York: Plenum Medical Book Company.

25. Fischer, J. E.: Total Parental Nutrition. 1976. New York: Little, Brown and Company.

26. Young, E., N. Heuler, P. Russell and E. Weser: Comparative nutritional analysis of chemically defined diets. Gastroenterology 69:549–559, 1970.

27. Butterworth, C. E.: Malnutrition in the hospital. J. Am. Med. Assoc. 230: 879, 1974.

28. Bistrian, B. R., G. L. Blackburn, E. Hallowell and R. Hadelle: Protein status of general surgical patients. J. Am. Med. Assoc. 230:858, 1974.

29. Butterworth, C. E.: The skeleton in the hospital closet. Nutr. Today 9:4, 1974.

30. Tobias, A. L. and T. B. Van Itallie: Nutritional problems of hospitalized patients. J. Am. Dietet. Assoc. 71:253, 1977.

31. Young, E. A. and E. Weser: Integration of nutrition in medical education. J. Nutr. Ed. 7:112, 1975.

VII. APPENDIX

1. 1978 schedule of required nutrition module for second year medical students
2. Nutrition Components Integrated in the Medical Curriculum
3. 1977–78 and 1978–79 Nutrition Lecture Series Brochures
4. Continuing Medical Education Conference Brochure

APPENDIX 1

NUTRITION MODULE, 1978 - 1979

DATE	TIME	TOPIC	PARTICIPANT(S)
MONDAY, 12/4/78	8:00-9:00 am	INTRODUCTION "Nutrition - The Cornerstone of Contemporary Health Care"..........	E.A. Young & D.W. Wilmore
IN PATIENT NUTRITION	9:00-11:00 am	SYMPOSIUM: HOSPITAL NUTRITION "Starvation, Injury and Sepsis"......	D.W. Wilmore
		"Relationship Between Nutrition and Immunity"......................	D.E. Thor
		"Nutrition as Adjunctive Therapy for Cancer Patients"...............	S.C. Cohen
		Symposium Moderator..........	C. Pestana
	11:00-12:00 pm	HOSPITAL ASSESSMENT "Metabolic Management of the Critically Ill - Why? When?.............	D.W. Wilmore
		How?..............	C.P. Page

All classes will meet in room 4.434T of the Dental School.

DATE	TIME	TOPIC	PARTICIPANT(S)
TUESDAY, 12/5/78 NORMAL NUTRITION	8:00-9:00 am	NORMAL NUTRITION "Nutritional Needs of Man" -and- "Nutrition and the Quality of Life" (Environmental and Biosocial Factors in Meeting Nutrient Needs of Man)..................	E.A. Young
	9:00-10:00 am	"Drug-Nutrient Interactions"........	R.P. Evens
	1:00-2:00 pm	"Nutrition Needs and Exercise"......	L.D. Horwitz
WEDNESDAY, 12/6/78 OUT-PATIENT NUTRITION	8:00-10:00 am	SYMPOSIUM: OBESITY THERAPY FADS, FACT, AND FICTION	
		"Prevalence, Etiology, and Dietary Treatment"...............	E.A. Young
		"Psychiatric Factors Affecting Treatment"....................	D.S. Fuller
		"Surgical Approaches to Obesity"....	C.P. Page
		"Medical Considerations"............	E. Weser
		Symposium Moderator..........	E. Weser

All classes will meet in room 4.434T of the Dental School.

DATE	TIME	TOPIC	PARTICIPANT(S)
WEDNESDAY, 12/6/78 OUT-PATIENT NUTRITION	10:00-12:00 pm	SYMPOSIUM: NUTRITION IN AMBULATORY MEDICINE	
		"Nutritional Status in Diabetes"....	R.L. Young
		"Diet in Cardiovascular Disease"....	M.P. Stern
		"Encounters with Nutritional Problems in Family Practice".....	A.K. Diehl
		Symposium Moderator..........	T.N. Caris
WEDNESDAY, 12/6/78	12:00-2:00 pm	FOOD AND NUTRITION EXHIBITS	Auditorium Foyer
THURSDAY, 12/7/78	8:00-9:00 am	FINAL EXAMINATION	Auditorium
	9:00-10:00 am	NUTRITIOUS REFRESHMENTS	Auditorium Foyer

All classes will meet in room 4.434T of the Dental School; Exhibit and Exam as indicated.

APPENDIX 2

NUTRITION COMPONENTS INTEGRATED IN THE MEDICAL CURRICULUM: THE UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT SAN ANTONIO, 1977

Nutrition concept covered	Specific goals and/or objectives	Course	Instructor	Approximate time (minutes)
PRECLINICAL CURRICULUM				
Anatomy				
Biochemistry:				
1. Role of vitamins as coenzymes	Recognition of coenzyme forms of vitamins and mechanisms of action; recognition of metabolic functions of vitamins that do not give rise to coenzymes.	Cellular and molecular biology	Faculty	90
2. Biochemical principles of protein nutrition.	Understanding of nitrogen balance and its relation to protein intake and essential amino acids.	do	do	90
3. Essential fatty acids	Understanding of fatty acid biosynthetic pathways and of the role of prostaglandins.	do	do	30
4. Energy metabolism	Understanding factors affecting the relative utilization of protein, carbohydrate and fats.	do	do	60
Microbiology:				
1. Host-parasite relationships	Multiple causation of infectious diseases	Microbiology	do	10
2. Enteric gram-negative bacilli (shigellosis, salmonellosis, cholera, E. coli).	Effect of enteric pathogens on gastrointestinal integrity	do	do	20
3. Mycobacteria	Effect of nutritional status in tuberculosis	do	do	5
4. Medical parasitology	Influence of intestinal parasites oh health	do	do	100
5. Enteroviruses	Influence of enteroviruses on health	do	do	45
6. Bacterial exotoxins causing food poisoning.	Influence of bacterial exotoxins on health	do	do	30
Pathology				
Pharmacology:				
1. Drug-nutrient interaction	For consideration of the influence of drugs on nutrient absorption, utilization and/or requirements.	Pharamacology	C. Smith	60
2. Vitamins	Supplementations, toxicity, etc	do	do	120
Physiology:				
1. Overview of gastrointestinal physiology.	Outline the components of the gastrointestinal tract: secretion, digestion and absorption; a consideration of the functional anatomy of the gastrointestinal tract; an appreciation of the mass and nature of material handled by the tract and its importance in maintenance of health.	Physiology	Bertrand	50
2. Secretory mechanism	A detailed discussion of the various secretory mechansims available to the gastrointestinal tract to add important materials to the lumen of the gut which carry out the particular function of each anatomical region of the gastrointestinal tract.	do	do	50
3. Gastric secretion	A careful examination of the secretions of the stomach, their source, their function and the regulation of these secretions.	do	do	50
4. Pancreatic secretion	A detailed discussion of the exocrine secretions of the pancreas, their source, their function and the means by which the pancreatic secretions are controlled including the effect of these controls on the nature of this secretion.	do	do	50

APPENDIX 2—Continued

NUTRITION COMPONENTS INTEGRATED IN THE MEDICAL CURRICULUM: THE UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT SAN ANTONIO, 1977

Nutrition concept covered	Specific goals and/or objectives	Course	Instructor	Approximate time (minutes)
Physiology—Continued				
5. Bile secretion	A description of bile secretion, storage and release including a consideration of source and nature of biliary secretions and their fate.	do	do	50
6. Water and electrolyte absorption	A brief discussion of water, Na^+, K^+, Cl^-, HCO_3^-, $Po_4^=$ and Ca^{++} absorption including postulated mechanisms; an evaluation of electrolyte secretion into the large bowel; a consideration of iron absorption and the role of the small intestine in the regulation of iron metabolism; a brief consideration of the absorption of water-soluble vitamins with particular emphasis on the absorption of vitamin B_{12}.	do	do	50
7. Carbohydrate digestion and absorption.	A description of the chemical nature of digestable carbohydrate, source of hydrolases, and their site of action, nature of hydrolytic products and mechanism of absorption of the products of carbohydrate digestion.	do	do	50
8. Protein digestion and absorption	A review of the chemical nature of protein with a description of the physical state of protein prior to degestion; a discussion of gastrointestinal protein hydrolyzing proenzymes, activation of proenzymes, products of encymic hydrolysis and absorption of hydrolysis products.	do	do	50
9. Lipid digestion and absorption	A description of digestible lipids followed by an analysis of the physical nature of lipid as substrate for digestion; the mechanism of lipid digestion and the means by which hydrolyzed lipid moves to the brush border to be absorbed; a brief indication of the fate of aborbed lipid; a description of the enterohepatic circulation of bile salts; a consideration of the absorption of fat-soluble vitamins.	do	do	50
10. Motility of the gut	Describe the functions of smooth muscle contraction in the gut, indicating the types of contraction present in different regions and how these are initiated. Give an account of how a bolus of food is propelled along the intestinal tract.	do	McCarter	50
11. Parathyroid hormone—Calcitonin-Calciferols.	For Calcitonin, to be able to: (a) Discuss its chemistry, the factors affecting its secretion, and its metabolic rate; (b) discuss its actions on its target organs; (c) discuss its physiologic significance and therapeutic potential. For vitamin D, to be able to: (a) Discuss the metabolism of vitamin D and the factors that regulate the synthesis of its active metabolites; (b) discuss the actions of the "hormone" on its target organs; (c) discuss its physiologic importance in the control of calcium, phosphorus and skeletal homeostasis.	do	Faculty	50
12. Energy metabolism	To be able to: (a) List the major processes in which energy is converted from one form to another in the body; (b) discuss the meaning of metabolic rate and its measurement; (c) list factors determining the energy balance of the body.	do	Kalu	100
13. Physiology of adipose tissue	To be able to: (a) Describe the general functions of adipose tissue; (b) discuss in detail the process of fat deposition; (c) discuss the process of fat mobilization including its endocrine and neural control; (d) discuss the regulation of plasma (FFA); (e) discuss the relationship between plasma (FFA) and the utilization of FFA by tissues.	do	McCarter	50

14. Regulation of adipose tissue	To be able to: (a) Describe the effects of age and sex on adipose tissue mass; (b) define obesity; (c) discuss the regulation of food intake; (d) discuss the factors influencing the number and size of adipocytes in the depots.	do	Masoro	50
15. Metabolic responses to feeding and fasting.	To be able to: (a) Describe the endocrine response to eating and its influence on metabolic patterns; (b) describe the changes in body mass and composition with fasting; (c) discuss the endocrine responses to fasting; (d) discuss the metabolic responses of liver, adipose tissue, muscles and brain to prolonged fasting.	do	do	50

INTERDISCIPLINARY TASK FORCE MODULES

Cardiovascular:				
1. Cholesterol and fat in causation of atherosclerosis.	Knowledge of role of cholesterol and fat in atherosclerolsis	Cardiovascular pathophysiology	McGill	60
2. Salt and hypertension	Control of salt in hypertension	Cardiovascular physiology	do	10
3. Obesity and cardiovascular disease		do	do	20
4. Biosynthesis of cholesterol and its laboratory measurement.		do	Mott	60
Clinical medicine				
Endocrinology:				
1. Diabetes mellitus		Endocrine pathophysiology	Friedberg	120
2. Hypoglycemia		do	Pestana	45
3. Endocrine control system		do		60
4. Normal growth, and growth hormone deficiency.		do	Franks	60
5. Glucocorticoid disorders		do	McGuire, Pestana	60
6. Thyroid physiology and pathophysiology.		do	R. Young	120
7. Parathyroid calcitonin and vitamin D		do		60
8. Hyperlipidemias		do	Friedberg	60
Epidemiology:				
1. Malnutrition and famine	Epidemiological consideration in malnutrition	Clinical epidemiology	Jensen	120
2. Dietary factors in the development of atherosclerosis.	Evidence from international comparisons and domestic studies with respect to dietary hypothesis of atherogenesis, plus discussion of dietary intervention trials.	do	Stern	90
Gastroenterology:				
1. Postgastrectomy absoprtion abnormalities, especially pertaining to fat, protein, iron and B_{12}.	To understand the importance of transit time, parietal cell mass in absorption of ingested food.	G.I. module (surgery)	Root	90
2. Gastritis, peptic ulcer, benign gastric ulcer.	To cover pathophysiology of gastritis and peptic ulcer disease and to interrelate patient management to this.	G.I. module (gastroenterology)	Welch	150
3. Energy-fuel interactions	To consider energy needs with specific emphasis on interaction of protein, carbohydrates, fats as caloric sources.	do	Wilmore	60
4. Malnutrition, malabsorption disorders.	To consider: (a) Overall concept of malnutrition; (b) various malabsorption syndromes and factors contributing to those disorders; (c) influence of malnutrition on the gastrointestinal tract.	do	E. Young, Urban, and Wilmore	240
5. Enteric infections	To review enteric infective agents and the consequences of enteric infections.	G.I. module (infectious disease and microbiology).	Craven	120
Growth and development: Nutrient needs of the infant and young child.	Changes in metabolic requirements as the child grows and develops	Growth and development, pathophysiology.	E. Young	120
Hematology:				
1. Iron and erythropoiesis	Iron requirement and metabolism	Hematology pathophysiology	Williams	15
2. Vitamin K and coagulation	Vitamin K requirement and therapy	do	Montiel	10
3. Folic acid, vitamin B_{12} and erythropoiesis.	Requirement, deficiency diseases and therapy	do	Williams	30

APPENDIX 2—Continued

NUTRITION COMPONENTS INTEGRATED IN THE MEDICAL CURRICULUM: THE UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT SAN ANTONIO, 1977

Nutrition concept covered	Specific goals and/or objectives	Course	Instructor	Approximate time (minutes)
Human genetics:				
1. Disorders of sulfur metabolism including homocystinuria, cystathioninuria.		Human genetics	Frimpter	50
2. Disorders of Krebs urea cycle		do	do	50
3. Disrders of tyrosine and phenyalanine metabolism including tyrosinemia and phenyalkeytonuria.		do	do	50
4. Disorders of branch chain amino acids		do	do	50
5. Disorders of isolated amino acid systems including histidinemia.		do	do	50
6. The concept of vitamin dependency		do	do	50
7. Nutritional management of genetic disorders.		do	E. You[illegible]	120
Infectious diseases				
Musculoskeletal:				
1. Discussion of rickets, scurvy	Recognition of need of vitamins to pre-musculoskeletal abnormalities	Musculoskeletal	Goldsmith	15
2. Osteomalacia and osteoperosis	Need for proper diet	do	Perselin	5
3. Fx healing	Need for proper diet	do	Green	3
4. Osteomyelitis	Need for proper diet, particularly protein intake so that tissue healing can occur.	do	Wilkins	2
5. High purine foods	Association with hyperuricemia; role in treatment	Musculoskeletal, pathophysiology	Persellin	5
6. Dietary sources of Ca and vitamin D	Role in pathogenesis and treatment of osteoporosis	do	Goldsmith	15
Neurobiology:				
1. Nutritional concepts as they affect the developing nervous.	Discussion of nutritional deficiences which lead to maldevelopment of the central nervous system.	Neuroscience (developmental neurobiology).	McMasters	10
2. Control of hunger and food intake as they relate to the hypothalamus.	Description of the role of the ventromedial nucleus and lateral hypothalamus in the regulation of food intake.	Neuroscience (hypothalamus)	Reiter	60
3. Metabolism of the nervous system	A consideration of the chemical composition of brain and the energy metabolism of brain.	Neuroscience	Masoro	60
4. Metabolic and degenerative diseases	Vitamin deficiencies, toxicities, etc	Neuropatho-physiology	Mackey, McMasters and Huntington.	480
5. Metabolic and degenerative diseases	Influence of protein deprivation on CNS development and function	Neuropathophysiology (developmental disorders).	Mackey	15
6. Anatomy and physiology of cerebral circulation.	Cerebral blood flow, oxygen, metabolism, etc	Neuroscience	Wissinger	120
7. Clinical presentation: Neuroendocrine disorder.	Hypothalamus—Pituitary: control of various functions relating to normal growth and development.	do	Allen	60
Nutrition:				
1. Nutrition: An integral aspect of health care.	A. Major overall goal: To understand and appreciate the importance of nutrition in health care. B. Specific objectives: To identify specific factors that have contributed to the recognition that nutrition be given greater emphasis as an essential component in health care; to gain some insight into the clinical relevance of nutrition in health care, some economic and preventive aspects; to consider some clinical examples of nutritional problems in caring for the sick.	Nutrition	E. Young, Weser, and Wilmore	50

2. Undernutrition: Protein-calorie malnutrition.	A. Major overall goal: Recognition of undernutrition B. Specific objectives: Clinical evaluation of nutritional status; laboratory confirmation of nutritional status; physiologic approach to therapy.	do	Nichols	50
3. Nutritional assessment in the hospital	A. Major overall goal: To gain knowledge of how to assess the nutritional status of hospitalized patients. B. Specific objectives: To understand how disease alters the nutritional status of the patient; to understand how nutritional status affects physiologic function; to learn how to systematically assess the nutritional needs of hospitalized patients; to consider approaches to providing nutrient needs.	do	Wilmore	110
4. Nutritional status in diabetes	A. Major overall goal: To define the role of diet and carbohydrate content in treatment of diabetes. B. Specific objectives: To define the relationship between obesity, insulin levels and blood sugar in the majority of adult onset diabetes; to outline the relative importance of weight loss versus carbohydrate content of the diet; to emphasize that dietary therapy must be individualized.	do	R. Young	30
5. Nutritional status as modified by stress, trauma or burn.	Major overall goal: To consider approaches to providing nutrient support during stress, trauma or burn.	do	Wilmore	30
6. Nutrition and infection	A. Major overall goal: To discuss the interrelationship between nutrition and infection. B. Specific objectives: To discuss the effects of infection on nutrition and infection. To discuss specific immunologic defects found during protein calorie malnutrition; to discuss the significance of these factors in our patient management.	do	Williams	30
7. Overnutrition: Obesity—issues, problems and approaches.	A. Major overall goal: To gain an understanding of the major aspects of obesity. B. Specific objectives: To consider the trends and current prevalence of obesity in the United States; to review some of the contributing causes of obesity; to assess the various approaches to obesity; to gain some understanding of the complexities of endocrine and metabolic aspects of obesity.	do	E. Young and Weser	110
8. Nutritional status and environmental factors.	A. Major overall goal: To gain greater insight into various environmental factors that may be associated with, or influence nutritional status. B. Specific objectives: To identify specific factors that influence nutritional status in the United States (10-State nutrition survey); to understand how nutrient intake may be modified by food production, processing, storage, or preparation; to realize variety of ways a nutrient deficit may occur; to obtain greater understanding of the importance of food choices, food habits as modified by a variety of factors.	do	E. Young	50
9. Diet and hyperlipoproteinemia	A. Major overall goal: To understand the principals linking dietary practices to atherosclerotic diseases. B. Specific objectives: To summarize some of the main types of epidemiological, pathological and clinical studies which have established a relationship between diet and atherosclerotic diseases; to learn the principals of making prudent dietary recommendations aimed at reducing the risk of atherosclerosis; to review the current status of the evidence suggesting that dietary modifications will, in fact, contribute to the prevention of a significant number of cases of atherosclerotic disease.	do	Stern	30

APPENDIX 2—Continued

NUTRITION COMPONENTS INTEGRATED IN THE MEDICAL CURRICULUM: THE UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT SAN ANTONIO, 1977

Nutrition concept covered	Specific goals and/or objectives	Course	Instructor	Approximate time (minutes)
Nutrition—Continued				
10. Nutritional status as modified by cancer.	A. Major overall goal: To gain knowledge of the currently known association of nutrition and cancer. B. Specific objectives: To explore evidence of nutritional factors in the cause of cancer; to examine the nutritional effect in patients with cancer; to gain an understanding of the nutritional effects associated with cancer therapy; to assess the approaches to provide nutritional support for patients with cancer.	do	Coltman	30
11. Nutritional status as influenced by exercise.	A. Major overall goal: To understand the importance of nutritional status on the efficiency of physical exercise. B. Specific objective: To assess the nutrient needs of man during exercise.	do	Horwitz	30
Psychiatry:				
1. Importance of prenatal nutrition in the mother and of neonatal nutrition.	To gain an understanding of prenatal nutrition in the mother and of neonatal nutrition.	Psychosocial aspects of medical care.	Bowden, Pierce, and Martin	20
2. Obesity	To gain an understanding of the psychosocial aspects of obesity and to gain an understanding of the behavior modification approach to treatment.	do	Fuller	60
Renal:				
1. Clinical fluid and electrolytes and acid base balance:				
(a) Introduction of clinical fluid and electrolytes.		Renal	Lifschitz	60
(b) Patterns of fluid and electrolyte disturbances: Medical aspects.		do	Kunau, Stein, and Reineck	120
(c) Patterns of acid-base disturbances in body fluids.		do	Kunau and Reineck	120
(d) Formulating plan of fluid therapy in adults.		do	Included in 1a	60
(e) Formulating plan of fluid therapy in children.		do	Sweeney	60
(f) Fluid and electrolytes: Case presentations.		do	Faculty	120
2. Chronic renal insufficiency	To gain an understanding of the problems in the body handling of essential nutrients, their metabolic products and/or various loads presented by the diet.	do	Bilbrey	60
3. Acute renal	To gain an understanding of the problems in the body handling of essential nutrients, their metabolic products and/or various loads presented by the diet.	do	Stein	60

4. Kidney transplantation	To gain an understanding of the problems of growth failure seen in children on chronic dialysis. To gain an understanding of the problems of obesity as well as growth failure seen in children once they are transplanted.	do	Banowsky	60
Reproductive:				
1. Maternal nutrition and fetal growth	To gain an understanding of the concepts relative to maternal nutrition and fetal growth.	Reproductive	Gibbs	60
2. Clinical considerations and nutritional management.	To gain an understanding of the clinical considerations relative to nutritional management.	do	Faculty	60
CLINICAL CURRICULUM				
Family practice				
Medicine:				
1. Therapeutic nutrition luncheon series	To provide discussion of diets as related to specific disease entities:			
	(a) Restricted protein in renal and liver diseases	Medicine clerkship	Forland	90
	(b) Low lactose		E. Young	90
	(c) Postgastrectomy		Weser	90
	(d) Salt restriction		Schnitzler	90
	(e) Amino acid restriction		Frimpter	90
	(f) Gluten restriction		Urban	90
	(g) Obestiy (caloric restriction)		E. Young and Weser	90
2. Medical grand rounds, house staff conferences, discussions (as needed).		do	Faculty	(1)
Ob-Gyn:				
1. Nutrition counseling	To provide students with techniques and opportunities for nutrition counseling for normal obstetrical patients.	Ob-gyn	Gibbs	(2)
2. Diet planning	Students participate in diet planning for diabetes and other obstetrical patients as well as operative gynecologic patients.	Ob-gyn	Weinberg and Huff	(3)
Pediatrics: Discussion, rounds, and conferences as needed.		Pediatric clerkship	Faculty	(1)
Psychiatry: Discussion, rounds, and conferences as needed.		Psychiatry clerkship	do	(1)
Surgery:				
1. Surgical nutrition	To discuss role of nutrition in providing increased requirements impaired by surgical disease.	Surgery clerkship	Schwesinger	60
2. Dietary management of patients	To discuss dietary management of patients with diverticular disease, peptic ulcer diseases, etc.	do	Faculty	(1)

---

[1] As needed.

[2] 5 to 6 patients (approximately 60 min each).

[3] As encountered.

Appendix 3

1978 Nutrition Lecture Series

THE UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT SAN ANTONIO

January 16

"Ascorbic Acid and the Common Cold"; Thomas C. Chalmers, M.D., President and Dean, Mount Sinai Medical Center School of Medicine, New York, N.Y., room 309L, 5 p.m.

February 20

"Role of the Liver and Gut in Plasma Protein Metabolism"; A. S. Tavill, M.D. Professor of Medicine, Director of Gastroenterology, Case Western Reserve University, Cleveland, Ohio, room 309L, 5 p.m.

March 15—Medical Grand Rounds

"Nutrition and Atherosclerosis"; John Farquhar, M.D., Professor of Medicine, Stanford University Medical School, Stanford, Calif. Co-sponsored by the Division of Clinical Epidemiology, Department of Medicine, UTHSCSA, room 409L, 8:30 a.m.

April 24

"Recent Advances in the Prevention and Treatment of Diabetes"; Kelly M. West, M.D., Professor of Medicine, University of Oklahoma Health Sciences Center, Oklahoma City, Okla. The Joseph Goldberger Visiting Professor in Clinical Nutrition Program, Sponsored by the American Medical Association; room 309L, 5 p.m.

Concept

This Nutrition Lecture Series is designed to provide new information for the physician regarding nutritional support for the patient.

Objectives

Upon completion of this lecture series, the participating physician will have reviewed and updated his knowledge of important areas of clinical nutrition including:

1. Assessment of clinical trial, with specific information on ascorbic acid and the common cold.
2. Nutritional influences on the role of the liver and gut in the metabolism of plasma protein.
3. Nutritional implications in atherosclerosis.
4. Current information regarding blood glucose regulation in patients with diabetes.

Credit

As an organization accredited for continuing medical education, The University of Texas Health Science Center at San Antonio certifies that this continuing medical education offering meets the criteria for one credit hour per lecture in Category I of the Physicians' Recognition Award of the American Medical Association, provided that it is used and completed as designed.

Each lecture is approved by the American Dietetic Association for continuing education credit of two hours.

1978–79 Nutrition Lecture Series

THE UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT SAN ANTONIO

October 16, 1978

"Sports Medicine: Nutritional Implications"; Nathan J. Smith, M.D., Professor of Pediatrics and Sports Medicine, University of Washington, Seattle, WA. Sponsors: Department of Medicine, Division of Human Nutrition; and Department of Pediatrics.

November 13, 1978

"Nutritional Management of Patients with Renal Insufficiency"; Mackenzie Walser, M.D., Professor, Departments of Pharmacology and Medicine, John Hopkins School of Medicine, Baltimore, MD. Sponsors: Department of Medicine, Divisions of Human Nutrition and Renal Diseases.

December 4, 1978

"Nutritional Influences on Periodontal Diseases"; Michael Alfano, D.M.D., Ph. D.; Director, Oral Health Research Center, Associate Professor of Periodontics and Oral Medicine, Fairleigh Dickin[illegible] [illegible]ersity, School of Dentistry, Hackensack, NJ. Sponsors: Department [illegible], Division of Human Nutrition; and UTHSCSA Dental School.

January 15, 1979

"A Longitudinal Study of Dietary Variables and their Significance in Human Aging"; Reubin Andres, M.D., Chief, Clinical Physiology Branch, National Institute on Aging, Gerontology Research Center, Baltimore City Hospitals, Baltimore, MD. Sponsors: Department of Medicine, Division of Human Nutrition; and Department of Physiology.

February 5, 1979

"Effect of Nutritional Factors on Brain Amino Acid Levels and Monoamine Synthesis"; Richard J. Wurtman, M.D., Laboratory of Brain and Metabolism, Department of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, MA. Sponsors: Department of Medicine, Division of Human Nutrition; and Department of Pharmacology.

March 5, 1979

"Malnutrition and the Immune Response"; Robert Suskind, M.D., Professor and Chairman, Department of Pediatrics, University of Southern Alabama, College of Medicine, Mobile, AL. Sponsors: Department of Medicine, Division of Human Nutrition; and Department of Microbiology.

April 2, 1979

"Perspectives on Proposed U.S. Dietary Goals"; Robert W. Prichard, M.D., Professor and Chairman, Department of Pathology, Bowman Gray School of Medicine, Wake Forest University, Winston-Salem, NC. Sponsors: Department of Medicine, Division of Human Nutrition; and Department of Pathology.

APPENDIX, 4

VITAMINS IN THE PRACTICE OF MEDICINE: VIA THE TELECONFERENCE NETWORK OF TEXAS

When: April 13, 1978—12:30–1:30 CT.

Where: Your hospital conference room or room designated for teleconference.

Synopsis: Vitamins play an increasingly important role in medicine. Some major issues that involve the physician's discriminate and knowledgeable use of vitamins include: orthomolecular psychiatry, ascorbic acid and the common cold, vitamins and malabsorption syndromes, drug-vitamin interaction, vitamin needs during hemodialysis, strict vegetarian diets, vitamin dependency syndromes, and vitamin toxicity.

Panelists: Elliot Weser, M.D., Professor and Head, Division of Gastroenterology, Department of Medicine, UTHSCSA. Eleanor A. Young, Ph. D., R.D., Associate Professor, Division of Gastroenterology, Department of Medicine, UTHSCSA.

STATEMENT OF JACK METCOFF, M.S., M.D., M.P.H., GEORGE LYNN CROSS RESEARCH PROFESSOR OF PEDIATRICS, BIOCHEMISTRY AND MOLECULAR BIOLOGY, UNIVERSITY OF OKLAHOMA HEALTH SCIENCES CENTER, OKLAHOMA CITY, OKLA.

It is a little difficult to generalize about how to develop a program in Human Nutrition at Health Sciences Centers. I use the term, "Health Sciences Centers", in preference to the term, "Medical Schools", in order to emphasize the concept that nutrition, by its very nature, is interdisciplinary. Education and training programs in the science and application of human nutrition knowledge must necessarily involve students and faculty of the various colleges comprising a Health Sciences Center campus, including the College of Medicine.

I appreciate this opportunity to tell you about our efforts at the University of Oklahoma Health Sciences Center to design an interdisciplinary program in Human Nutrition as part of the Core Curriculum involving students and faculty of five colleges on the Health Sciences Center campus: Medicine, Dentistry, Nursing, Health, and Pharmacy. In many ways our program development is like the experience of the few other Centers trying to develop a nutrition program.

Our first objective was to design a course acceptable to all colleges as part of their Core Curriculum. Our second objective was to implement the course. The third objective was to have students apply nutrition knowledge, skills and attitudes for the improved health of our patients and community. With the help of a small planning grant (from the Health Professions Special Project Grant Program of the Health Resources Administration, Bureau of Manpower, HEW) beginning in July 1976, representatives of the five colleges including the Deans, participated in monthly meetings and numerous task force subcommittee efforts to design a program for Nutrition Education. The planning process culminated with a proposal requesting Support for the implementation of an interdisciplinary program in Human Nutrition for students. Outside funds were essential, since state funds were not available. The proposal drew heavily on the recommendations of the Williamsburg conference and upon available information concerning nutrition education at other medical schools.

We wanted to motivate the future provider of nutritional advice to effectively employ contemporary knowledge of human nutrition for the maintenance and improvement of health, as well as for treatment of nutrition-related diseases; that is, to provide a before-the-fact of illness approach to the use of nutritional intervention rather than only an after-the-fact approach. A carefully planned program satisfying the needs of the several colleges was developed which seemed administratively feasible, and was designed for careful evaluation. We hoped it would be suitable for use as a prototype by other institutions. Several features of the proposal were unique, we thought: first, Nutrition Education would become a required part of the health education experience; second, we had gotten Deans and curriculum representatives of each college to work in concert to define the curriculum objectives; third, professional educational evaluators participated from the earliest stage of planning of the three-level course. Fourth, we proposed to use existing faculty, reimbursing their Colleges for their time, thereby making the program truly interdisciplinary and responsive to each College, but owned by none. The attached diagram schematically illustrates the concept of our three-level approach.

Let me briefly describe the three consecutive phases of the program:

The first phase was packaged into six units, representing the different stages of the life cycle of man. These 16 lectures were designed for presentation to combined sections of first-year students from all Colleges. The content of the course was based upon and extended, but did not duplicate, basic science information provided by the Departments of Biochemistry and Physiology. This first core course was designed as a bridge between the scientific aspects of nutrients as elemental entities and as dietary components of human nutrition contributing to health maintenance and disease response; a bridge between science, man and society, needed to provide basic knowledge and encourage the persistence of humanistic values among health professional students. Satisfactory completion of the Phase I Core Curriculum was a prerequisite for entry into Phase II, which would be implemented the following year.

The second phase was designed to present specialized material and develop nutrition skills, tailored to meet special needs of the students of each college. For example, those of Dentistry in contrast to those of Medicine or Nursing. In Phase II, the course would be given in the individual college by an intercollege faculty. The major objective of the Phase II program was to stimulate the students to identify and relate to problems of human nutrition, pertinent to their orientations. The problems so identified would then be developed by faculty and students into a project, based either in the hospital or in the community, which could be attacked and solved.

In Phase III, small teams of students, applying the knowledge and attitudes acquired during the preceding two years, would elect one of the identified nutrition problems in the hospital or community and attempt to solve it under the supervision of an appropriate faculty member. This problem-oriented team approach once again would bring the students from the five colleges together to gain experience working as teams to solve some specified problem in human nutrition. The effectiveness with which these objectives were attained by each of the teams would be professionally evaluated. Thus, the student completing all three phases of the Human Nutrition program should be able to fulfill our third major objective, that is, to apply the program in Human Nutrition as an extension of his or her health care experience.

During the development of this proposal to implement our program in Human Nutrition, several realities quickly became apparent. The difficulties are applicable to most schools in some degree.

First, Nutrition Education in Health Sciences Centers suffers from an Identity Crisis. Nutrition is not usually recognized as a separate discipline and characteristically, fragments of nutrition are taught by many different departments at different times, and each from its own highly focused perspective. For example, Biochemistry teaches nutrition and enzymes; Physiology, nutrition and muscle contraction; Surgery, nutrition and life support after the stomach is removed; Pediatrics, salt and water therapy, infant feeding and nutrients to avoid for sick infants, etc. No department teaches nutrition, health and the life cycle.

Second, everyone agreed that Nutrition Education should be holistic, integrated, and comprehensive, but no department would undertake that effort at a sacrifice of its classical curriculum.

Third, it was clear that a senior faculty person had to be designated as responsible for the program.

Fourth: Most troublesome, was the need to have allotted curriculum time, preferably block time. All of the College Deans agreed—so did the Department Chairmen. The stumbling block was the curriculum committees—who were being asked to amputate time from major departments in order to allot it to a non-department.

The fifth problem was to identify faculty from many disciplines and each of the Colleges, who would devote at least 20% of their time to learning more about contemporary nutrition and participate in the orchestration of the program in Human Nutrition under the baton of the Program Director. That seemed impossible at first, but the potential availability of funds to reimburse the individual Departmental budgets for the time-equivalent portion of these faculty salaries permitted the Deans and Department Heads to think of the program more as a symphony, than as an improvisation.

A major problem, of course was lack of money to recruit and train competent faculty, to develop a critical mass for nutrition education, to develop stimulating new educational materials, etc.

The program was developed, the grant request was submitted to HEW for funding so that we could implement the program, the program director was designated and the curriculum committees were busily working on introduction of Human Nutrition into their curricula—all seemed beautiful. That was Spring 1977. Our grant was approved—but cut to one-tenth of that needed. We were given one year support for a 3 year program, since the Agency had changed its priorities after soliciting grant requests. The award permitted development of some educational materials, provided partial support of one faculty member representing the Dietetics Department in the College of Nursing (the Program Director drew no salary from the grant), a secretary, and two student graduate assistants. There would be no support for Phase II and Phase III; hence, Phase I would have to stand alone. This information, conveyed some three months after the intended starting date, generated something less than enthusiasm among the various Colleges, all of whom except Medicine and Dentistry had completed and consolidated their curriculum-planning for the then beginning school year.

I have rather tediously developed this other side of the coin to emphasize a point. There is need for some kind of assurance for program directors and their institutions, that a competitive, innovative, practical program, developed through a planning grant, will be implemented.

Restricted to one year, for a 3 year program, with insufficient funds to incorporate or recruit faculty, the question was how to implement any program for teaching "Nutrition and Stages of Man".

This is what we did. We created two videotape families—one poor and the other middle-class. In the poor family, Tina, a fifteen-year old teenage mother is unmarried, and is in the middle of her second pregnancy. Her food preferences run to snacks, junk foods, and "pop". She doesn't have much energy, fights with her mother, and resents any outside intervention; but she *will* talk to the school nurse, and does attend the University Clinic. Tina's little one-year old boy, Bo, has failed to thrive, and is developmentally behind. Actually, he is cared for mostly by Tina's mother. Tina has a nine year old brother, Jim, who has rotted teeth. Tina's mother, Jane, is 32, very fat, and is a diabetic. She spends most of her time either in the kitchen or in the living room watching television. Bill, Tina's father, is 36 years old, a laborer and an alcoholic. He knows he is an alcoholic, but is sure he can quit anytime he wants to. They participate in the Federal family food assistance program and several child feeding programs.

Our other family, the middle-class one, has a 21-year old daughter, Gail who has just had a baby born with fetal malnutrition. She is a confirmed strict vegetarian. Her first child, Michael, now three years old, has been raised on a vegetarian diet and is now quite undernourished. Gail's husband, Eric, is 22 years old and is an ovovegetarian, that is, eats eggs as well as vegetables, and jogs regularly, at least five miles every day. Gail has a brother, Loren, who is 15, obese and has diabetes. He is having quite a lot of problems in school with his peer group. Gail's mother, Virginia, is 42, quite stylish. Appearance is very important to her and she is constantly trying out all the new fad foods and diets recommended by the magazines she reads, e.g.: What to eat to have beautiful hair, skin of a youth, the figure of a model, the energy of an athlete, and to be socially desirable. Her husband, Mark, is 45. He's been very successful in his business which does involve quite a few business lunches with a few martinis. He is overweight and rather worried now, since he was just discharged from the hospital after having had a coronary. Gail's grandmother is 66. She appears much older, is very thin and very picky about her diet, because she has been wearing dentures for ten years and cannot eat all foods with comfort, or without embarrassment. Her husband, Gail's grandfather, is 70 and occupies most of her time—he has a gastrointestinal tract cancer, is becoming quite emaciated and is afraid to eat because of discomfort. He sees a doctor, who knows he needs an operation, but feels that he is deteriorating so fast that nutrition treatment won't help and he is afraid that the operation might prove too much for him.

Of course, we don't really want to wish all of those ills on any two real families. They are hypothetical, but they do illustrate every nutrition problem that is prevalent in our society today disguised in the Tinas and Gails and the Marks and the Bills who need, but do not get, the nutritional guidance required to make them more effective citizens. These families represent the nutritional challenge for all health professionals. Yet Health Professionals often fail to recognize gaps in contemporary nutrition knowledge, or to discriminate between dogma and fact. There is a tendency to oversimplify rather than to deal with the simultaneous complexities of reality. When Health Professionals learn and apply contemporary knowledge of nutrition, and how to work together to meet the human and nutritional needs of these families, we should have no trouble teaching Health Professions students how to address and meet those nutritional needs, given the opportunity to do so. We Health Professionals have to learn first. That can only be accomplished by training and participation in Nutrition programs. There are too few of these. They cannot survive or grow without support.

MULTI-PHASE, INTERDISCIPLINARY PROGRAM IN HUMAN NUTRITION EDUCATION

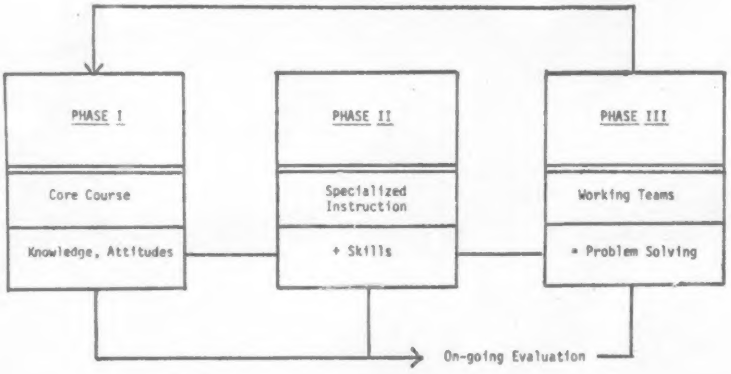


FIGURE 1

[The following information was furnished by Dr. William D. Holden of the National Board of Medical Examiners, see p. 41 for his oral presentation.]

NATIONAL BOARD OF MEDICAL EXAMINERS

A. OBJECTIVES, PROGRAMS, AND SERVICES[1]

The National Board of Medical Examiners is incorporated and is recognized as a voluntary, nonprofit, unofficial examining agency, the purposes of which are (1) to prepare and administer qualifying examinations of such high quality that legal agencies governing the practice of medicine within each state may in their discretion grant a license without further examination for those who have completed successfully the examinations of the National Board and have met such other requirements as the National Board may establish for certification of its Diplomates; (2) to cooperate with, and, where appropriate, to make its specialized services available to the examining boards of the states, specialty boards, and other organizations concerned with the education and qualification of personnel in the fields of health; (3) to assist medical schools, hospitals, and related organizations and institutions in evaluation of the effectiveness of their educational programs; (4) to initiate, develop, and participate in research designed to evaluate the effectiveness of educational programs and techniques, and to assess even more precisely the knowledge, competence, and qualification of those preparing for and continuing to assume responsibility for the health of the public; (5) to provide educational opportunities for professional personnel in the methods, techniques, and values of testing methods related to knowledge and competence in the broad field of medicine.

Founded in 1915 by Dr. W. L. Rodman, the National Board includes in its membership representation from The Federation of State Medical Boards, the American Medical Association, the Association of American Medical Colleges, the American Hospital Association, the Council of Medical Specialty Societies, the American Board of Medical Specialties, interns and residents, the American Medical Student Association, the Student National Medical Association, the Armed Forces, the Department of Health, Education, and Welfare, and the Veterans Administration. The chairmen of the National Board test committees and advisory committees serve as members during their tenure in office. In addition the Board includes twenty members-at-large.

The National Board is recognized as an influential and important factor in maintaining high standards of medical education and in testing with thoroughness physicians' qualifications for the practice of their profession. Its examinations are now taken by more than three-quarters of the medical students in the U.S.A. and are approved widely by medical schools and state boards of medical licensure.

National Board certification provides a permanent record of qualification that is accepted without further examination by the licensing authorities of the states with very few exceptions.

A number of medical schools use National Board examinations for all students as an additional, impartial, objective, well-established, external evaluation of the student's progress. If, but only if, the school requires the examination to be a current official examination administered on the dates regularly scheduled by the National Board, the students gain the advantage of having one set of examinations that meet the requirements of the medical school and satisfy requirements of the official licensing boards. An additional advantage to the school lies in the fact that the detailed analysis of the examination results gives the medical school faculty a useful yardstick which may help to measure its educational program.

Other examining and certifying agencies in the medical and allied health fields have increasingly turned to the National Board for assistance in the development of their examinations. These include The Federation of State Medical Boards, the Medical Council of Canada, the Educational Commission for Foreign Medical Graduates, a majority of the American medical specialty boards, several specialty societies, and several agencies concerned with physician's assistants and other allied health groups. The National Board assists these various groups in the preparation of certifying, in-training, self-assessment, and recertifying examinations as they desire.

---

[1] *Source:* National Board of Medical Examiners. Bulletin of Information and Description of Examinations. pp 5–7.

In 1977, to make it possible for alien physicans who desire to immigrate to the United States to meet a requirement placed upon them by Congress, the National Board developed a Visa Qualifying Examination. The passing standards for this examination were strictly comparable to those of the National Board's own examinations, and it was administered with the aid of the Educational Commission for Foreign Medical Graduates to approximately 5,800 physicians in twenty-seven centers throughout the world.

In 1976, a total of 161,396 examinations were administered to individuals within the various programs in which the National Board has a part. These consisted of 39,748 examinations in Part I, Part II, or Part III; 77,680 other examinations based upon National Board test material; and 43,968 examinations or programs prepared by other groups, including medical and allied health boards and societies.

B. RELATIONSHIP BETWEEN NATIONAL BOARD AND STATE BOARDS[2][3]

There has never been any thought on the part of the National Board to set itself up as a national licensing body. It is the function of the individual states to determine who shall practice within their borders and to maintain high standards of medical practice in accordance with their own rules and regulations. In recognition of the thoroughness and widely accepted standards of the National Board examinations, its certificate is accepted as adequate qualification by the medical licensing authorities of the District of Columbia and all states except Louisiana and Texas. Some states require an additional personal appearance or a short oral examination. Louisiana and Texas accept endorsement of National Board certification only of those licensed elsewhere by National Board endorsement prior to March 18, 1971 and January 1, 1978, respectively. Additionally, the certificate of the National Board is accepted for initial licensure in the Canal Zone, Guam, Puerto Rico, and the Canadian provinces of Alberta and Ontario.

In addition to their official boards of medical licensure, six jurisdictions that accept National Board certification (five states and the District of Columbia) have separate examining boards in the basic sciences. The laws of all enable them to accept the basic sciences examinations of the National Board in lieu of their own. These are Arkansas, Connecticut, the District of Columbia, South Dakota, Utah, and Washington.

C. NATIONAL BOARD EXAMINATIONS: OBJECTIVES AND DESCRIPTION[4]

A fundamental asset of the National Board, upon which the quality of its examination system depends, is the large group of medical educator-scientists who make up the examining committees. This distinguished core of examiners, responsible for the content and thrust of the National Board examinations, includes over 100 individuals selected from among the foremost men and women teaching at United States and Canadian medical schools. These examiners of the NBME serve with rotating membership the thirteen separate committees for the basic sciences and clinical sciences, Parts I and II, and on the two committees for Part III.

As homework in their own schools, these examiners invest heavily in the development of concepts and questions for the National Board examinations. During their annual two-day meetings with staff experts in evaluation, there is far-ranging discussion of the objectives, uses, and validity of the examinations that they are responsible for creating. The content of the whole examination in basic sciences and clinical sciences is finalized in a subsequent meeting involving representatives from the multiple disciplines concerned. This system of developing the tests of the National Board with changing representation from medical school faculties assures continuous close relationship between the examination system and the educational system.

---

[2] NOTE: Regulations of state licensing boards are subject to change without notice. The National Board of Medical Examiners is not an official depository for these regulations. Those recorded here represent presumably authentic ones on file at the time this section of this booklet was revised—October 1977.

[3] *Source:* National Board of Medical Examiners. Bulletin of Information and Description of Examinations, 1978. pp. 8–9.

[4] *Source:* 1976–1977 Annual Report. National Board of Medical Examiners. pp. 18–19.

Program and objectives	*Description of examination*
Part I—To measure knowledge and comprehension of the basic medical sciences: The first of the three examinations for qualification for certification by the National Board of Medical Examiners.	A comprehensive 2-day examination consisting of approximately 1,000 multiple-choice questions equally distributed across the disciplines of anatomy, behavioral sciences, biochemistry, microbiology, pathology, pharmacology, and physiology. The test is administered in June and September in multiple testing centers.
Part II—To measure knowledge and comprehension of the clinical sciences in medicine: The second of the three examinations for qualification for certification by the National Board of Medical Examiners.	An examination in multiple-choice format consisting of approximately 900 items administered in a 2-day period twice a year. Questions are derived equally from internal medicine, obstetrics and gynecology, pediatrics, preventive medicine and public health, psychiatry, and surgery. Topics characteristic of subspecialties and general areas such as legal medicine are represented as they are relative to the major subjects.
Part III—To assess the measurable aspects of competence after the young physician has graduated from medical school and has gained experience in graduate medical education with responsibility in patient care under supervision: Successful completion of this examination after an individual has received the M.D. degree and has passed part I and part II is the basis of National Board certification. Part III is administered only to candidates for certification.	An interdisciplinary examination, 1 day in length, that is administered in March with opportunity for correction of failures before the following July. It is focused on problem-solving abilities and utilizes programmed testing in the form of patient management problems (PMP), as well as multiple-choice questions, many of which require interpretation and analysis of illustrations, graphs, or tables of data.

D. OTHER EXAMINATIONS DEVELOPED FROM NATIONAL BOARD TEST MATERIAL[4]

Program and objectives	*Description of examination*
FLEX (federation licensing examination) (*for the Federation of State Medical Boards*)—To measure the knowledge and comprehension of basic and clinical medical sciences and evaluate clinical understanding and competence in a uniform manner and with reference to standards of performance of recent graduates of U.S. medical schools in order to assist the medical licensing boards of the various states and jurisdictions.	A 3-day comprehensive examination in the general format of and derived from examination material of the National Board of Medical Examiners. The questions are selected by committees that represent the various state medical licensing boards. The first day is devoted to basic medical sciences, the second to clinical science, and the third to clinical competence. Scoring is based upon the "FLEX weighted average" which places increasing emphasis on the clinical sciences and clinical competence sections.

ECFMG examination *(for the Educational Commission for Foreign Medical Graduates)*—To assess the medical knowledge of graduates of foreign medical schools who plan to participate in graduate medical education in the United States.	A day-long examination consisting of 360 multiple-choice items selected principally from the part II examination and, to a lesser extent, from the part I examination of the National Board of Medical Examiners. Scoring is calculated in relation to the scores achieved by American students. The examination is administered twice a year in multiple centers in foreign countries and the United States of America by the Educational Commission for Foreign Medical Graduates.
MCC examination *(for the Medical Council of Canada)*—To contribute an evaluation of the knowledge of clinical sciences and clinical competence to be utilized by the Medical Council of Canada in constructing an examination that is made available to the provinces for use in their medical licensure proceedings.	A two-part comprehensive 2½-day examination derived in part from multiple-choice items and patient management problems previously employed in the National Board examinations. Since 1975, increasing portions of this examination have been made from questions provided by the R. S. McLaughlin Examination and Research Centre at Edmonton.
NBME tests in individual subjects for medical school use—To provide a measurement of knowledge in each of the traditional basic and clinical science disciplines, and to provide a means for comparing student performance with a nationwide reference group of American medical students.	These examinations are individual subject tests that have been extracted from previously administered part I or part II examinations. These tests, provided at the request of individual schools or departments, are made available for administration at times determined by the school, e.g., the end of a given unit of instruction.

STATEMENT OF JACK RUTLEDGE, PRESIDENT, AMERICAN MEDICAL STUDENT ASSOCIATION, DUKE UNIVERSITY MEDICAL SCHOOL, DURHAM, N.C.

Mr. Chairman, my name is Jack Rutledge and I am the President of the American Medical Student Association. AMSA is an independent organization representing 22,000 medical students at 124 allopathic and osteopathic medical schools. We would like to thank you for inviting us to testify on this timely topic of nutrition education in medical schools. We are not experts in the area of nutrition or medical education. As medical students, we are consumers of medical education and we are very interested in seeing more nutrition included in the medical curriculum. It is from this vantage point that we offer the following observations and suggestions.

It is our feeling that as physicians we should have at least a minimum level of knowledge and skill in the area of human nutrition. We should be able to instruct our patients in principles of correct nutrition, answer questions and solve problems about diet, health and disease, recognize and treat disorders arising. As physicians we should be able to offer sound nutritional advice to all patients, especially those who are pregnant, breast feeding, raising a family, and the elderly. All physicians should understand the nutritional component of common diseases such as diabetes, hyperlipidemia and renal disorders. We should be able to answer questions patients have concerning the many fad diets currently being advocated. Last, and certainly not least, as physicians we must be able to apply all of this information to the everyday eating habits of our patients.

The ideal would be for all physicians to have the knowledge listed above. The sad truth is that very few physicians have this level of expertise in the area of nutrition and of those that do, most gained this knowledge outside of the regular medical curriculum. This situation leads not only to neglect of a potentially useful therapeutic and preventive tool; it also can lead to poor patient care and the potential of overlooking a patients' major problem.

What is the current status of nutrition education in medical schools? A 1976 survey of the U.S. medical schools by the American Medical Association showed the following results.

Percentage of schools with:

A. A required nutrition course	19
B. An elective nutrition course	70
C. Nutrition incorporated into another course	95
D. Clerkships in nutrition	28
E. Opportunities for students to do nutrition research	80
F. Postgraduate or continuing education studies in nutrition	31

At first glance these statistics look somewhat encouraging. We have been told that the most recent survey, done this past year, shows even better results. However, there are some observations we would like to make concerning these data. We'll proceed by category.

A. Required nutrition course—19%

This course is usually taught in the basic science years, and averages 20 hours. Topics covered vary in each course. We would like to congratulate those schools taking this approach. It is our feeling that a separate course on nutrition is necessary in order for this subject to receive proper emphasis.

However, this approach can be unsuccessful if the material is too didactic and is taught without emphasizing practical clinical applications. Often a nutrition course receives lesser emphasis and has to compete for study time with subjects which carry more weight in overall evaluations. Finally, material learned in the basic sciences is often forgotten unless followed by reinforcement during the clinical years of training.

B. Elective nutrition course—70%

While this approach is better than nothing, it is wholly inadequate. We suspect that a very small percentage of students at these schools take such electives. This approach alone demonstrates a lack of emphasis by the school on nutrition.

C. Nutrition incorporated into another course—95%

This is a catch-all category. Biochemistry, physiology, and pharmacology are the courses most often claimed to contain some nutrition instruction. Too often in such courses nutrition is touched upon only briefly and in such a manner that it is uninteresting and irrelevant. It is hardly ever emphasized. It is quite possible to finish such a course and not even know that nutrition was covered. Having nutrition taught by those whose main interest is elsewhere simply doesn't work.

D. Clerkships in nutrition—28%

A clerkship covering clinical nutrition is the best place to learn the basics of applied nutrition. Such clerkships should encompass all of the basic concepts in nutrition and should not be limited to just pediatrics, hyperalimintation, or some other specialty area as is often the case. Schools which offer clerkships in clinical nutrition are taking steps in the right direction. However, these clerkships are almost always elective and are taken by few students. Medical schools have, on the average, between 40–60 clinical electives. Clinical nutrition must compete with many other more standard electives for student time.

E. Opportunities for students to do research in nutrition—80%

This is certainly a necessary component in the overall picture especially in stimulating interest among future researchers in nutrition. This opportunity is not useful, however, to the average medical student since most do not become involved in research activities.

F. Postgraduate or continuing education studies in nutrition—31 %

Hopefully this number has improved significantly in the last two years. When we consider that a large percentage of learning by physicians takes place in postgraduate training and continuing education it is hard to believe that only 31% of medical schools offer postgraduate studies in nutrition.

We would like not to paint a totally negative picture. Many schools are attempting to incorporate nutrition into their curricula in a meaningful manner. Much improvement has taken place in recent years. However, we would like for a realistic appraisal of the situation to take place.

From our testimony so far you probably have some idea of what we consider to constitute a good teaching program in nutrition. We would like to elaborate on this for a moment. In order for nutrition to receive proper emphasis in medical education and practice it should be included throughout the continuum of medical education. It should be included in the basic sciences and clinical years of medical school, residency training and in continuing medical education courses.

Medical schools should have separate departments of nutrition, or at the least, a distinct division within a larger established department with the responsibility to coordinate all these activities. This department should be staffed by physicians and other health professionals who have as their main interest the application of nutrition to the everyday practice of medicine.

During the basic sciences nutrition should be taught as a separate course which should include basic nutrition concepts with clinical applications. Students should be able to see practical applications to what they are learning. This course should receive emphasis equal to that of other more standard basic science courses.

During the clinical years separate electives in clinical nutrition should be available which cover the practical everyday uses of nutrition in medical practice. They should not be limited to certain specialized areas such as hyperalimentation. In addition, departments such a smedicine, pediatrirs, surgery, obstetrics-gynecology should include nutritionists in their rounds and discussion of the nutritional aspects of patients on a regular basis. Regular seminars on applied nutrition should also be included. These activities should be coordinated with the nutrition department and would reach a greater number of students than would the nutrition elective alone.

Postgraduate training programs, especially those in the primary care specialties should also teach applied nutrition. This can be done by having on staff clinicians interested in nutrition and again, could be coordinated with the department of nutrition at the medical school. If funding limitations make it necessary to choose between these various activities, the postgraduate training programs should probably receive priority for it is during residency training that most physicians learn and retain the knowledge and skills they will use regularly as physicians.

Finally, continuing education courses covering basic applied nutrition should be offered to practicing physicians. Ongoing evaluation should take place to measure the effectiveness of each approach in teaching nutrition so that appropriate changes and improvements can be made as experience is gained.

The obstacles in the way of implementing such a system at most medical schools include lack of funds, lack of clinicians with expertise in nutrition, lack of time in the curriculum, and lack of perceived importance by curriculum committees.

Increased funding for nutrition programs in medical schools should come from both government and private sources. Medical schools themselves should be willing to expend some of their own funds in this area as a criteria for receiving federal assistance in establishing nutrition programs.

We would recommend the establishment of a small number of regional nutrition centers for the purpose of conducting nutrition related research and training clinicians with special expertise in nutrition. As these clinicians graduate from these centers, they can begin to staff nutrition departments at other medical schools and fight within the academic system for more curriculum time and emphasis for nutrition.

Progress in achieving meaningful change in this area can be achieved with the commitment and mutual cooperation of government, foundations, medical schools and medical students. We offer our support and assistance.

Again, thank you.

REFERENCES

1. Barnes, R. H., Doctors' Dietary Antics, Nutrition Today, 3:21 (1968).

2. Butterworth, C. E. Jr., The Skeleton in the Hospital Closet, Nutrition Today, 9:4 (March 1975).

3. Copparelli, E., The Role of Nutrition in Medicine, The Mount Sinai Journal of Medicine, 44(4):574–576 (July 1977).

4. Cyborski, C. K., Nutrition Content in Medical Curricula, Journal of Nutrition Education, 9:17–18 (Jan. 1977).

5. Flynn, et al., Nutrition in the Education of the Family Physician, Journal of the American Dietetic Association, 65:269–274 (Sept. 1974).

6. Fraukle, et al., Nutrition Education in the Medical School: Experience With an Elective Course for First-year Medical Students, The American Journal of Clinical Nutrition, 25:709–719 (July 1972).

7. Meiling, R. C., Iatrogenic Malnutrition III: The Institutional System, Nutrition Today, 9:34 (July 1974).

8. Oliveira, J. E., Teaching Nutrition in Medical Schools: Some Problems and Solutions, Journal of Nutrition Education, 6:49–51 (April 1974).

9. Phillips, M. G., The Nutrition Knowledge of Medical Students, Journal of Medical Education, 46:86 (1971).

10. Symposium on Nutrition in Medical Education, The American Journal of Clinical Nutrition, 30:796–824 (May 1977).

[Pursuant to the hearing on September 20, Senator Bellmon asked each witness to answer four additional questions in writing, the questions and responses of each witness follows:]

Question 1. During the hearing on September 20 you received a copy of the Labor-HEW appropriations report language calling for $10 million for interdisciplinary training and curriculum development. As the language reads, "the committee is concerned that physicians and other health professionals being trained in the Nation's medical schools and other institutions only in rare cases received quality instruction in human nutrition". What guidelines would you suggest to the health resources administration to wisely expend these funds.

Answer to question 1 by Dr. Butterworth:

In my opinion it will be imperative that the Health Resources Administration set up a system of peer-review by recognized experts in the field of Nutrition. Membership on the initial panel should be highly selective and subject to prior review and comments from a few prestigeous non-governmental organizations (for example: The Food and Nutrition Board of NAS/NRC; The National Nutrition Consortium; The AMA department of Foods & Nutrition; and the AMA Council on Allied Health.)

This panel should assist the administrator in identifying specific goals, mechanisms for developing curricula and training programs, and a set of realistic target dates for program review. Under present circumstances I believe 50 to 75 percent of the funds should be allocated through well-defined contracts. The remaining 25 to 50 percent could be utilized to support carefully-planned interdisciplinary training programs. The panel should set up explicit criteria for program evaluation and for annual review to determine eligibility for continued financial support. The panel should make "on-site" visits prior to allocation of funds, to make certain that interdisciplinary cooperation is indeed feasible, or in existence and viable—and not merely an *ad hoc* arrangement on paper.

In my opinion it would be a mistake to attempt to distribute the proposed $10 million equally to all schools of medicine, dentistry, allied health, and public health. Selected institutions should develop model programs of excellence, and to train "cadre" for future use elsewhere. The panel should establish firm guidelines of eligibility under which institutions might apply for funds under this program.

Answer to question 1 by Dr. Wilson:

I wish to express appreciation to you and your colleagues for inviting me to testify before the Senate Nutrition Committee. I found the morning to be of great interest and I am sure that the witnesses gained perhaps as much as did the Senate and staff personnel from listening to each other. It is clear to me that there is a great deal of interest among at least a small group of faculty amongst the various medical schools with regard to improving nutrition education in our professional schools.

One profession that was not represented at our hearings would be the dental profession. I believe that you will find that dental schools are perhaps among the very worst offenders with respect to providing good, adequate and solid nutrition education to dental students. At least this has been my passing observation.

The provision of ten million dollars for interdisciplinary training and curriculum development is a good, positive step and I am grateful for those who have supported this provision of the Labor-HEW appropriations bill. As you have suggested however, it is important that guidelines be established so that this money might be expended wisely.

It is important that one or two faculty members in each school of medicine act as not only teachers of clinical nutrition but as advocates for nutrition in this curriculum. It seems that the short-term answer would be to establish a few training programs at institutions such as Boston University, University of Alabama or Massachusetts Institute of Technology, where current faculty at medical schools could go for a short-term training program. I would suspect that an intensified program could be completed in perhaps one semester or six months. If funds could be made available to free faculty for this sort of training and then funds could also be given to establish such training programs, this would provide for immediate needs. In the long run however, it would be important to establish regular academic training programs for physicians in Nutrition and Clinical Nutrition. We need to produce many more M.D.'s with Ph.D.'s in nutrition or equivalent experience.

I am somewhat apprehensive of the Federal Government funding faculty positions in nutrition directly because of the historical vagaries of such funding, such as Capitation Programs. I am sure that many schools have qualified faculty members already trained in Internal Medicine, Physiology, etc., who would be interested in providing additional expertise to their schools in the areas of nutrition. If the schools could be reimbursed for training programs or if the training programs could be supported, this would take a step towards closing the gap.

There does have to be some way to measure progress, of course. It would be important to document the state of nutrition education at least in a select number of schools, and then compare the quality and quantity of education by various means, at the conclusion of 1, 2, 3, 5 and 10 years, etc.

Again, I emphasize the importance of establishing the faculty as advocates of nutrition in Veterinary, Medical and Dental Schools. Without such people it would be very difficult for nutrition to compete against some rather glamorous subject areas.

Answer to question 1 by Dr. Sandson:

The Dean of the medical school, with guidance from his faculty, should name a Director of Nutrition Education who would have as a major responsibility the development of nutrition teaching programs throughout the four years for the medical school curriculum.

(a) The Director should have the appropriate credentials and should have an M.D. and/or Ph.D. with research, service and teaching experience in human/clinical nutrition.

(b) The currriculum committee should provide blocks of time within the first two years for nutrition education and on a par with other blocks (e.g., physiology, etc.). The amount of time provided would probably have to be negotiated but the experience at Boston University School of Medicine is that 18–24 hours within the first year should be sufficient. These hours should be devoted to discussions of nutritional requirements for growth and maintenance in contrast to the role of nutrients within metabolic pathways (e.g., thiamine and transketolase) which should have been covered in biochemistry.

(c) Required blocks of time should be made part of the Pathology course in the second year. Again, our experience is that 4 hours of lecture with an equal amount of time in a laboratory setting discussing actual cases is sufficient. An understanding of the nutritional pathology present would result in more efficient health care of the patient.

(d) A significant amount of time should be given the required curriculum prior to the students beginning their clinical rotations. This time period should be devoted to the teaching of how best to nutritionally support the hospitalized patient using both lectures and case presentations. After five years of experience at Boston University School of Medicine, we would suggest that this block of time (3 days) be given at the end of the major patho-physiology course or, in our case, at the end of the Biology of Disease course. Biology of Disease is the major pre-cilinical course given at Boston University School of Medicine and is systems oriented (e.g., the Pathophysiology of Disease of the Cardiovascular, Renal Hemotopoietic, etc., systems). Providing nutrition to all systems.

(e) Nutrition rounds should be established for students during their clerkships in Medicine, Surgery and Pediatrics. Some time should be set aside for students to meet with nutrition instructors to discuss patients with nutritional-related problems. These rounds should be held at least monthly.

(f) Electives in Nutrition should be available for fourth-year students and might range in time from one to three months. We have electives offered by Dr. W. P. Steffee in Medicine, Dr. Mike Miguid in Surgery and Dr. J. J. Vitale (Director of Nutrition Education Programs) in Pathology and Pediatrics.

(g) A nutrition consult service should be developed for housestaff—such a service is available at two of our major teaching hospitals, Boston City Hospital and University Hospital.

Answers to question 1 by Dr. Young:

Suggestions to the Health Resources Administration include:

(a) Include some physicians with a definite interest and expertise in nutrition on the Review Board to assure that only high quality proposals be approved for funding.

(b) Include as an essential component of funding some evaluation mechanism—some way that the participating school will evauate this program.

(c) Careful review of the qualifications of the key personnel to be involved in the particular program, especially the Director.

Answers to question 1 by Dr. Metcoff:

At the earliest possible moment establish a series of on-going meetings between representatives of the Agency, Congress, interdisciplinary representatives of health sciences centers and their administration, and other nutrition educators.

(A) The purpose of these group meetings would be to plan strategies and define operational objectives of nutrition education programs, i.e., what is meant by "quality instruction"; what level of competence should the student attain with respect to human nutrition? This, of course, is a touchy question but if handled properly need not infringe upon the academic prerogatives of the teaching institutions.

(B) Basic Criteria for Program Eligibility. Consideration should be given to the following:

(1) For what period of time would a university be prepared to commit effort to establish educational/training/applied research programs in human nutrition? A minimum of six years seems desirable in order to permit the sequential training of three generations of students through all four levels of medical education. Are health sciences centers or equivalent institutions prepared to develop an identified academic nutrition unit with a designated responsible director or chairman? This unit could be either interdepartmental and therefore, interdisciplinary in nature with a director reporting primarily to a committee of deans, or to the provost rather than to any single department head within the College of Medicine. Another alternative would be to establish a department of human nutrition within the medical college and establish a chair to lead the department. There are probably other variations which might be suitable. One of the points made repeatedly by all of the witnesses at the recent hearing, was the need for an identified academic unit and an identified director of that unit. The language of the appropriations report calls for interdisciplinary training and curriculum development. This indicates the need to establish interdisciplinary programs on health sciences center campuses which will serve all colleges and professional disciplines, but ideally, belong to no one college. The bridging nature of a program in human nutrition will require flexibility and emphasis on different perceived needs at different times. Meeting these needs would be difficult if the program was a primary function of only one college, i.e., the College of Medicine, since medical schools may not be willing to implement programs suitable for the educational needs of nurses, pharmacists, dentists, etc. To attempt to reproduce many programs in all of these colleges on a single campus would, in my opinion, not only be wasteful but is likely to be unsuccessful, since sufficient numbers of competent faculty would not be available for all programs.

(2) To what extent would the different colleges on a health sciences center campus provide access to curriculum time?

The rather inflexible structures of most curricula preclude the easy introduction of new programs. The fact that human nutrition is taught as a required course with designated curriculum time in so few schools suggests that most schools do not consider the subject of sufficient importance to define curriculum time by displacing some hours of other more traditional courses.

(3) To what extent will schools be willing to tackle this central issue if funding nutrition programs may not fulfill the intent of the language of the bill?

(4) To what extent will institution programs be willing to address community needs as well as institutional needs with respect to student education?

(C) Evaluation of programs. The suggested committee or group should determine what mechanism would be used to evaluate requests from institutions for support of the programs in human nutrition. They should also consider mechanisms for periodic evaluation of programs which have been funded and implemented as a result of the appropriation.

Implementation of the legislation

(A) What procedure will be followed for requesting applications from institutions for individuals within institutions wanting to establish a program in human nutrition?

(B) What review process will be used to evaluate applications and to award funds? I would suggest that study sections be established. These study sections would be composed of individuals with high levels of demonstrated competence in the field of nutrition, including, education of health science professionals in human nutrition, as well staff members of the Agency. I would also suggest that at least two assistants to Senators on the Nutrition Committee of the Senate be asked to be non-voting members of the study section. I believe this would help both orientations and be most educational and lead to more practical considerations by the study sections.

A second component of the review process should be mandatory site visits to all programs requesting significant funding to establish programs in nutrition education. The site visit will permit assessment of strength and weaknesses, local problems relative competences and lead to appropriate evaluation of the program. In my opinion, it is better to invest funds in the site visit aspect of the programs in order to effect greater savings by decreasing the likelihood for fundings of potentially inadequate programs irrespective of the current excellence of the written grant applications.

Answer to question 1 by Dr. Holden:

I would suggest that the first step by HRA would be to survey each medical school by a well constructed questionnaire directed to determining what the nature and content of the teaching of nutrition is in each school, what faculty members are responsible, do departments of nutrition exist, what funding is available to them for this type of teaching, do deficiencies in the teaching exist, how can it be improved, and if assistance grants were made available what plans would each school have for their use.

With this kind of information it would be more practical for HRA to provide assistance grants, development grants, fellowships, etc.

I stress the above approach because the final decisions will be made by each separate faculty and constructive decisions will be made more frequently if appropriate incentives based upon factual information are provided.

Question 2. To what extend is your institution preparing the competent faculty needed to staff nutrition programs in the nation?

Answer to question 2 by Dr. Altschul:

Our own institution is not preparing competent faculty since we do not have a graduate school in nutrition. But there are enough such schools around to assure that competent staff can be developed.

Answer to question 2 by Dr. Butterworth:

The University of Alabama in Birmingham has a full-time Department of Nutrition Sciences, supported jointly by three schools: the School of Public and Allied Health; the School of Medicine, and the School of Dentistry. It is also involved with and partially supported by other elements of the University, including the Hospitals and Clinics.

Medical students receive 40 hours of classroom instruction in Nutrition during the freshman year, in a specifically identified required course provided by the Department of Nutrition Sciences. This is in addition to nutrition components that also appear in biochemistry, hematology, gastroenterology, etc.

The Department offers a program leading to the M.S. degree in Clinical Nutrition. At present there are 35 students enrolled in this graduate program. Eight students have already received their M.S. degree. A Ph. D. program in Nutrition is under development at present.

Departmental members are actively involved in a variety of research and training projects, ranging from pure analytical biochemistry and studies of food composition to clinical studies of hospital malnutrition, mental retardation, obesity, and heart disease. We believe that future graduates of this institution will be better prepared than at any time in the past 20 years to deal with nutrition problems—whether as physicians or dentists or professionals in other health-related fields.

Answer to question 2 by Dr. Sandson:

Boston University School of Medicine has had a graduate program (Ph.D.) in nutrition for over five years. We have recently started an M.D.-Ph.D. Program in Nutrition and also provide clinical experience for Ph.D. candidates from a program at MIT. Despite the variety of programs, the number of individuals we have trained to be faculty members in nutrition is still quite small.

Answer to question 2 by Dr. Young:

At present we do not have a program designed to prepare competent faculty to staff nutrition programs in medical schools.

A problem related to this is that there is no recognized subspecialty in nutrition.

Answer to question 2 by Dr. Metcoff:

Institutional Preparation of Competent Faculty needed to Staff Nutrition Programs.—The major problem here is that most schools have no designated administrative unit which could receive funds sufficient to establish a continuing program and to recruit and train faculty. Since funds are not available in most instances there is no inducement to establish such nutrition units as identified administrative components. Several possible mechanisms might be used to encourage institutions to consider development of competent faculty for nutrition education programs.

(A) The RFA from HEW should contain language emphasizing faculty recruitment and postgraduate training as an essential component for the development of programs in human nutrition education.

(B) Schools must designate a program director and an administrative unit with a basic budget sufficient for critical staffing to develop teaching/training/research teams. I would suggest that in addition to the program director at least one person from the major professional disciplines (i.e., Colleges: Medicine, Nursing, Dentistry, Public Health, Pharmacy) be designated as a full-time member of the nutrition program unit.

(C) It seems essential that schools create an identified nutrition unit to mount an interdisciplinary program. This unit should report to a committee of deans, or to the chief administrative officer of the health sciences center.

Each of the above items are interrelated and will require almost simultaneous action. It is desirable that HEW be prepared to encourage and support these activities through the mechanism of the appropriation, if schools are to be responsive to the intent of the bill.

Answer to question 2 by Dr. Holden:

Case Western Reserve University has a Department of Nutrition. I personally, being a member of the Department of Surgery, am not well enough acquainted with the total effort being employed in the school of medicine. A more satisfactory and thorough answer could be obtained from the Dean of the School of Medicine, Dr. Frederick C. Robbins.

Within the Department of Surgery all students and residents are taught both formally and informally the complexities and management of nutrition but principally with relation to acutely ill patients with complex disease problems.

Question 3. Do you feel the professional societies/associations you belong to are doing all they can to advance the teaching of nutrition in medical schools?

Answer to question 3 by Dr. Butterworth:

Yes. I think they are doing all they possibly can within the constrains of their constitutions, budget, and voluntary time commitments.

Answer to question 3 by Dr. Sandson:

Some of the professional societies are calling attention to the deficiencies in nutrition education in medical schools. This is especially true of the American Medical Association.

If the specialty organizations emphasized nutrition more on their board examinations it would probably lead to improved education in nutrition at all levels.

Answer to question 3 by Dr. Young:

Most of the societies that I belong to are nutrition-related, such as: American Society for Clinical Nutrition; American Board of Nutrition; American Society for Parenteral and Enteral Nutrition; and American Dietitic Association.

There is a definite effort being made by all of these groups to have greater emphasis on nutrition in medical schools. This problem has been a topic of discussion at national meetings of these societies. Interest is high. There is recognition of need to do something about this problem. Other than raise the level of awareness of this problem, most of these societies are in no financial position to actually do much about it.

Answer to question 3 by Dr. Metcoff:

Are Professional Societies Doing All They Can? I do not think so, I do not have sufficient data to be sure. The American Society for Clinical Nutrition, the American Medical Association and the American Academy of Pediatrics have specific Committees dealing with nutrition and nutrition education. These societies are important but neither the AMA nor the APP are sufficiently prestigious in the perception of health science center facilities. Prestige research societies in medicine, at least, while recognizing the importance of nutrition have little interest in this field as a priority area for either committee activity or programming concern at national meetings. If possible the societies should be encouraged to give more program emphasis to human nutrition and nutrition education. The best way to accomplish this woudl be through the establishment of intersocieties committees. Here the main problem is money. For example, there would be no problem to create an expert committee representing major research societies to deal with nutrition and nutrition education. But no society has funds to subsidize travel, meetings, or staff for such purposes. While it may seem paradoxical to suggest that major research societies be involved with the development of nutrition education programs, there is no paradox. The major research societies are highly selective and membership is usually based upon academic distinction while the members of the society carry out individual programs which lead to their selection for membership, they do so as faculty members with defined educational responsibilities in most instances. Membership in the prestigious research societies usually is achieved by senior faculty who have major influence on curriculum and budget in their institutions. Medical schools, per se, usually do not have the budgetary flexibility nor altruism to allocate moneys to support extramural intersociety meetings. Research or educational grants to individual investigators or to institutions usually do not permit use of funds for such purposes.

I would like to suggest that the National Academy of Sciences, National Research Council be approached to consider developing an interdisciplinary committee for nutrition and nutrition education under the aegis of the Food and Nutrition Board but subsidized by HEW/HRA. This committee could be composed primarily of MDs/Ph.Ds/nutritionists, anthropologists, sociologists, and should have representatives from Congress,* the American Association of Medical Colleges, the American Public Health Association, and from selected state health departments. The charge to this Committee should be to evaluate the needs, state of the art, and suggest policies concerning nutrition education for health professionals and application of their training to the health care system. Such a committee could have a significant impact on policy or education in human nutrition and for its relevance to national needs.

Should such a committee ever be formed I would like to be a member to participate in its deliberations.

**Composition of Suggested Committee within N.A.S.:* I would suggest that Senate Committee on Nutrition designate two or three assistants to members of the Committee to serve as non-voting members of the AAS Committee. This would greatly facilitate orientation.

Answer to question 3 by Dr. Holden:

The surgical societies that I relate to (American College of Surgeons, American Surgical Association. Society of University Surgeons, and Central Surgical Association) do present a great deal of material on nutrition in the form of speeches, panels, courses, and research presentations. Most of these deal with the preparation of a malnourished patient for operation, nutritional management during the postoperative period, the prevention of complications with adequate nutrition, and the nutritional management of protracted postoperative complications. These presentations are made by faculty members of schools of medicine located throughout the country. The presentations not only reflect what is being taught in the schools but they also provide a very real incentive for members of the audience to either institute or expand teaching in the same area.

Question 4. Would you identify, *in priority fashion*, what you feel are the three most important actions (other than the need for more funds) to be taken and by whom to advance the teaching of nutrition in medical schools?

Answer to question 4 by Dr. Altschul:

We are usually in haste to consider that the spending of money solves a problem. I strongly believe that nutrition education in medical schools is a terribly important subject to be supported. I feel, however, that there are sufficient examples now in the various medical schools to be able to try to draw some conclusions. I would, therefore, suggest as first priority that studies be made of what is going on and how much it is affecting medical practice. In a sense these should be pilot studies in several institutions to derive therefrom models of what ought to be in the curriculum, how it ought to be managed, and what one can expect from such education. In addition to this, there ought to be substantial seed money to allow these kinds of programs to be developed in other institutions.

As I mentioned in my testimony, nutrition education in medical schools must improve the opportunity for review and updating information to practicing physicians which can be given in a variety of ways including one day meetings at the medical schools, development of movies and other teaching materials, and the appropriate holding of nutrition sessions at annual medical conferences.

It is imperative that this kind of effort be coordinated with the examination procedures so that examination questions in nutrition shall have a formal place in the medical examination.

I do not believe that the first limiting factor is a shortage of competent faculty. The first limiting factor is lack of a commitment by the medical schools to assign the responsibility of being the ombudsman and the leader in nutrition teaching to a senior faculty person. Once this is done, the provision of adequate resources will enable the program to begin.

Answer to question 4 by Dr. Butterworth:

(a) Establish interdisciplinary clinical teams to deal with nutrition problems in the hospital and outpatient clinics. This ranks as top-priority because the teams will assuredly identify problems that need solution. This will demonstrate at first hand the very real and frequent nature of nutritional disorders in the health-care setting, and the dramatic results obtainable with therapy. This will inevitably create a suitable climate and a demand for more nutrition education.

This should be done at the level of the Dean or Vice-President for Health Affairs to ensure interdisciplinary cooperation and communication.

(b) Medical school deans (or higher ranking officials) should require that hospitals used in the teaching of medical students have an effective Nutrition Advisory Committee reporting to the hospital administrator and/or the dean.

Similarly, a committee should be established within every department of Pathology to review all cases of death, regardless of whether an autopsy is performed. Any factor including malnutrition, contributing to mortality and morbidity should be made part of permanent hospital statistical records and reported to an appropriate higher authority.

(c) The Joint Commission on Accreditation of Hospitals should set up strict standards for the provision of Nutrition services (diagnosis, therapy, and patient instruction). Accreditation should be denied hospitals that lack adequate trained personnel, that do not have an effective staff structure, and do not have appropriate physical facilities for providing essential nutrition services.

Answer to question 4 by Dr. Sandson:

For the most part, this question has been answered in Question No. 1. The school should identify a qualified individual to assume the responsibility of developing an educational program. Secondly, the curriculum committee with this individual should assign reasonable periods of time in the required curriculum during the first two years of medical school for nutrition education. Finally, the clinical departments should incorporate in their third and fourth-year programs teaching rounds and conferences in nutrition.

Answer to question 4 by Dr. Young:

Important actions.—Impact on medical school administrators on the essentiality of nutrition in health care so that it will be included in the curriculum.

By whom.—Medical school accrediation bodies.

Important actions.—See to it that nutrition concepts are adequately covered in the questions included in the qualifying medical board exams.

By whom.—Board of medical examiners. (A review of questions included in Review Boards for medical licensure examinations that could be classified as "nutritional," ranged from 0.05 percent to 0.2 percent of the total number of questions asked (Wen et al., J. Am. Dietet. Assoc., 63:408, 1973).

Important actions.—Develop a recognized subspecialty in nutrition. In connection with this, nutritional assessment and dietary counseling and history taking should be reimbursable items under insurance programs, HMOS, etc.

Answer to question 4 by Dr. Metcoff:

Priority for Action and By Whom?—Create an expert consultant group to interact with a senate committee on Nutrition in order to initiate and maintain a dialog between professionals and Congress regarding the state of the art in human nutrition and nutrition education for health professionals.

The consultant group would meet periodically at the request of the Senators in an informal seminar-type atmosphere in order to consider how the nutritional needs of the country might best be met through the mechanism of nutritional education of professionals. While the Senate committee could benefit the expertise of the nutrition professionals, the nutrition professionals, in turn, would be greatly benefited by any improved understanding of congressional interests, priorities, limits, political considerations, etc. So often, health professionals tend to be idealists without understanding for the practical realities imposed by legislation, national needs, and social and political responsibilities. I see the interactions between the parties to this seminar as contributing the more effective achievement of the intent of the language in the proposed Appropriations Bill.

Create an Advisory Committee on Nutrition, probably as a Committee of the American Academy of Science, NRC, as discussed above.

Identity pilot model programs which could be studied to determine their needs, strengths and weaknesses, in order to establish a quantitative data base for guidance of future programs and for future funding.

Answer to question 4 by Dr. Holden:

(a) As I stated in the question period following the testimony the greatest distortion of nutrition in this country is overweight and obesity which are related to a massive number of diseases that cause disability and death. Although teaching in medical schools is important and can be improved, the most benefit would in the long run be derived from a national publicity campaign by HEW, similar to their efforts in the field of smoking. The medical profession principally the American Medical Association and the American College of Physicians could be of assistance in such an effort.

(b) Incentives to schools of medicine in the form of project grants, research and teaching fellowships with specific proposals submitted in the applications.

(c) Incentives to establish Departments of Nutrition in universities with a close relationship to their schools of medicine and nursing.

I would in closing, Senator, like to reiterate and emphasize the position of the National Board of Medical Examiners with respect to the issue of teaching nutrition in the schools of medicine. The National Board must reflect in its Parts I, II, and III examinations what is being taught in schools of medicine. The Board can be fair to its examinees only if it maintains this position. It cannot assume through the device of examinations a position of dictating to 130 independent schools of medicine what they should or should not be teaching. Any effort to change their perspective of a curriculum because of public need should come from the public through its representatives directly to the schools and indirectly through the multiple national societies that have a responsibility to define public need and to transmit such information to the schools. The organizations best equipped to perform such a service are the Association of American Medical Colleges and the American Medical Association which sponsor the Liaison Committee on Medical Education which reviews the structure and function of each medical school periodically.

ACCREDITED MEDICAL SCHOOLS AND SCHOOLS OF BASIC MEDICAL SCIENCES IN THE UNITED STATES, 1977–78

Medical schools (ownership)	Year organized	Dean or executive officer
Alabama:		
University of Alabama School of Medicine, Birmingham 35294 (public).	1859	James A. Pittman, Jr., M.D.
University of South Alabama College of Medicine, Mobile 36688 (public).	1967	Robert A. Kreisberg, M.D.
Arizona: University of Arizona College of Medicine, Tucson 85724 (public).	1967	Louis J. Kettel, M.D. (acting).
Arkansas: University of Arkansas College of Medicine, Little Rock 72201 (public).	1879	Thomas A. Bruce, M.D.
California:		
University of California School of Medicine, Davis 95616 (public).	1968	C. J. Tupper, M.D.
University of California College of Medicine, Irvine 92664 (public).	1962	Stanley van den Noort, M.D.
Loma Linda University School of Medicine, Loma Linda 92354 (private).	1909	G. Gordon Hadley, M.D.
University of California School of Medicine, Los Angeles 90024 (public).	1951	Sherman M. Mellinkoff, M.D.
University of Southern California School of Medicine, Los Angeles 90037 (private).	1885	Allen W. Mathies, Jr., Ph. D., M.D.
Stanford University School of Medicine, Palo Alto 94305 (private).	1908	Clayton Rich, M.D.
University of California School of Medicine, San Diego 92037.	1968	John H. Moxley III, M.D.
University of California School of Medicine, San Francisco 94143 (public).	1864	Julius R. Krevans, M.D.
Colorado: University of Colorado School of Medicine, Denver 80220 (public).	1883	Harry P. Ward, M.D.
Connecticut:		
University of Connecticut School of Medicine, Farmington 06032 (public).	1968	Robert U. Massey, M.D.
Yale University School of Medicine, New Haven 06510 (private).	1812	Robert W. Berliner, M.D.
District of Columbia:		
Georgetown University School of Medicine, 20007 (private)	1851	John P. Utz, M.D.
George Washington University School of Medicine, 20037 (private).	1825	Ronald P. Kaufman, M.D.
Howard University College of Medicine, 20059 (private)	1868	Marion Mann, M.D.
Florida:		
University of Florida College of Medicine, Gainesville 32610 (public).	1956	William B. Deal, M.D. (acting).
University of Miami School of Medicine, Miami 33152 (private).	1952	Emanuel M. Papper, M.D.
University of South Florida College of Medicine, Tampa 33620 (public).	1965	Hollis G. Boren, M.D. (acting).
Georgia:		
Emory University School of Medicine, Atlanta 30322 (private).	1854	Arthur P. Richardson, M.D.
Medical College of Georgia, Augusta 30902 (public)	1828	Fairfield Goodale, M.D.
School of Medicine at Morehouse College, Atlanta 30314 (private).	1978	Louis W. Sullivan, MD
Hawaii: University of Hawaii School of Medicine, Honolulu 96822 (public).	1967	Terence A. Rogers, Ph. D.
Illinois:		
Chicago Medical School University of the Health Sciences, Chicago 60612 (private).	1912	Marshall A. Falk, M.D.
Northwestern University Medical School, Chicago 60611 (private).	1859	James E. Eckenhoff, M.D.
Loyola University of Chicago, Stritch School of Medicine, Maywood 60153 (private).	1915	Joseph A. Wells, Ph. D., M.D.
Rush Medical College, Chicago 60612 (private)	1969	Leo M. Henikoff, M.D. (acting).
Southern Illinois University School of Medicine, Springfield 62708 (public).	1969	Richard H. Moy, M.D.
University of Chicago, Pritzker School of Medicine, Chicago 60637 (private).	1927	Robert B. Uretz, Ph. D. (acting).
University of Illinois College of Medicine, Chicago 60612 (public).	1881	Truman O. Anderson, Ph. D., M.D.
Indiana: Indiana University School of Medicine, Indianapolis 46202 (public).	1903	Steven C. Beering, M.D.
Iowa: University of Iowa College of Medicine, Iowa City 52242 (public).	1850	John W. Eckstein, M.D.
Kansas: University of Kansas School of Medicine, Kansas City (public).	1905	James T. Lowman, M.D.

ACCREDITED MEDICAL SCHOOLS AND SCHOOLS OF BASIC MEDICAL SCIENCES IN THE UNITED STATES, 1977-78—Continued

Medical schools (ownership)	Year organized	Dean or executive officer
Kentucky:		
University of Kentucky College of Medicine, Lexington 40506 (public).	1954	D. Kay Clawson, M.D.
University of Louisville School of Medicine, Louisville 40201 (public).	1837	Arthur H. Keeney, M.D.
Louisiana:		
Louisiana State University of Medicine, New Orleans 70112 (public).	1931	Paul F. Larson, M.D. (acting).
Tulane University School of Medicine, New Orleans 70112 (private).	1834	James T. Hamlin III, M.D.
Louisiana State University School of Medicine, Shreveport 71130 (public).	1966	Ike Muslow, M.D.
Maryland:		
Johns Hopkins University of Medicine, Baltimore 21205 (private).	1893	Richard S. Ross, M.D.
University of Maryland School of Medicine, Baltimore 21201 (public).	1807	John M. Dennis, M.D.
Uniformed Services University of the Health Sciences School of Medicine, Bethesda 22014 (public).	1976	Jay P. Sanford, M.D.
Massachusetts:		
Boston University School of Medicine, Boston 02118 (private).	1873	John I. Sandson, M.D.
Harvard Medical School, Boston 02118 (private)	1783	Daniel C. Tosteson, M.D.
Tufts University School of Medicine, Boston 02111 (private)	1893	Lauro F. Cavazos, Ph. D.
University of Massachusetts Medical School, Worcester 01605 (public).	1962	Roger J. Bulger, M.D.
Michigan:		
University of Michigan Medical School, Ann Arbor 48104 (public).	1850	John A. Gronvall, M.D.
Wayne State University School of Medicine, Detroit 48201 (public).	1885	Robert D. Coye, M.D.
Michigan State University College of Human Medicine, East Lansing 48824 (public).	1966	W. Donald Weston, M.D. (acting).
Minnesota:		
University of Minnesota Medical School, Minneapolis 55455 (public).	1883	N. L. Gault, Jr., M.D.
Mayo Medical School, Rochester 55901 (private)	1971	John T. Shepherd, M.D.
University of Minnesota School of Medicine, Duluth 55812 (public).	1972	John LaBree, M.D.
Mississippi: University of Mississippi School of Medicine, Jackson 39216 (public).	1903	Norman C. Nelson, M.D.
Missouri:		
University of Missouri School of Medicine, Columbia 65201 (public).	1840	Charles C. Lobeck, M.D.
University of Missouri School of Medicine, Kansas City 64108 (public).	1968	Richardson K. Noback, M.D.
Saint Louis University School of Medicine, St. Louis 63104 (private).	1903	David R. Challoner, M.D.
Washington University School of Medicine, St. Louis 63110 (private).	1899	M. Kenton King, M.D.
Nebraska:		
Creighton University School of Medicine, Omaha 68178 (private).	1892	Joseph M. Holthaus, M.D.
University of Nebraska College of Medicine, Omaha 68105 (public).	1881	Perry G. Rigby, M.D.
Nevada: University of Nevada School of Medical Sciences, Reno 89507 (public).	1967	Thos. J. Scully, M.D.
New Hampshire: Dartmouth Medical School, Hanover 03755 (private).	1797	James C. Strickler, M.D.
New Jersey:		
CMDNJ-New Jersey Medical School, Newark 07103 (public)	1956	Vincent Lanzoni, M.D. Ph. D.
CMDNJ-Rutgers Medical School, Piscataway 08854 (public)	1966	David J. Gocke, M.D.
New Mexico: University of New Mexico School of Medicine, Albuquerque 87131 (public).	1960	Leonard M. Napolitano, Ph. D.
New York:		
Albany Medical College of Union University, Albany 12208 (private).	1839	Stuart Bondurant, M.D.
State University of New York at Buffalo School of Medicine 14214 (public).	1846	John Naughton, M.D.
Columbia University College of Physicians & Surgeons, New York 10032 (private).	1767	Donald F. Tapley, M.D.
Cornell University Medical College, New York 10021 (private)	1898	Theodore Cooper, M.D. Ph. D.
Albert Einstein College of Medicine of Yeshiva University, New York 10461 (private).	1955	Ephraim Friedman, M.D.
Mount Sinai School of Medicine of the City University of New York 10029 (private).	1968	Thomas C. Chalmers, M.D.
New York Medical College, New York 10029 (private)	1860	Samuel H. Rubin, M.D.
New York University School of Medicine, New York 10015 (private).	1841	Ivan L. Bennett, Jr., M.D
State University of New York College of Medicine, Brooklyn 11203 (public).	1860	Leonard Laster, M.D.

ACCREDITED MEDICAL SCHOOLS AND SCHOOLS OF BASIC MEDICAL SCIENCES IN THE UNITED STATES, 1977-78—Continued

Medical schools (ownership)	Year organized	Dean or executive officer
New York—Continued		
University of Rochester School of Medicine & Dentistry, Rochester 14642 (private).	1920	J. Lowell Orbison, M.D.
State University of New York at Stony Brook School of Medicine 11794 (public).	1962	Mervin Kuschner, M.D.
State University of New York College of Medicine, Syracuse 13210 (public).	1834	George F. Reed, M.D.
North Carolina:		
University of North Carolina School of Medicine, Chapel Hill 27514 (public).	1879	Christopher C. Fordham III, M.D.
Duke University School of Medicine, Durham 27710 (private).	1930	Ewald W. Busse, M.D.
Bowman Gray School of Medicine, Winston-Salem 27103 (private).	1902	Richard Janeway, M.D.
East Carolina University School of Medicine, Greenville, 27834 (public).	1977	Wm. E. Laupus M.D.
North Dakota: University of North Dakota School of Medicine, Grand Forks 58202 (public).	1905	Thomas M. Johnson, M.D.
Ohio:		
University of Cincinnati College of Medicine, Cincinnati 45267 (public).	1819	Robert S. Daniels, M.D.
Case Western Reserve University School of Medicine, Cleveland 55106 (private).	1843	Frederick C. Robbins, M.D.
Ohio State University College of Medicine, Columbus 43210 (public).	1914	Henry G. Gramblett, M.D.
Medical College of Ohio at Toledo 43614 (public)	1964	John P. Kemph, M.D.
Wright State University School of Medicine, Dayton 45401 (public).	1976	John R. Beljan, M.D.
Northeastern Ohio Universities College of Medicine, Rootstown 44272 (public).	1977	Robt. A. Liebelt M.D., Ph. D.
Oklahoma: University of Oklahoma School of Medicine, Oklahoma City 73190 (public).	1900	Thomas N. Lynn, M.D.
Oregon: University of Oregon Medical School, Portland 97201 (public).	1887	Robert S. Stone, M.D.
Pennsylvania:		
Pennsylvania State University College of Medicine, The Milton S. Hershey Medical Center 17033 (private).	1967	Harry Prystowsky, M.D.
Hahnemann Medical College and Hospital, Philadelphia 19102 (private).	1848	Joseph R. DiPalma, M.D.
Jefferson Medical College of Thomas Jefferson University, Philadelphia 19107 (private).	1824	William F. Kellow, M.D.
Medical College of Pennsylvania (formerly Women's), Philadelphia 19129 (private).	1850	Alton I. Sutnick, M.D.
Temple University School of Medicine, Philadelphia 19140 (private).	1901	Roger W. Sevy, Ph. D., M.D.
University of Pennsylvania School of Medicine, Philadelphia 19174 (private).	1765	Edward J. Stemmler, M.D.
University of Pittsburgh School of Medicine, Pittsburgh 15261 (private).	1883	Gerhard Werner, M.D.
Puerto Rico: University of Puerto Rico School of Medicine, San Juan 00936 (public).	1949	Enrique Prez-Santiago, M.D.
Rhode Island: Brown University Program in Medical Science, Providence 02912 (private).	1963	Stanley M. Aronson, M.D.
South Carolina:		
Medical University of South Carolina College of Medicine, Charleston 29401 (public).	1823	W. Marcus Newberry, Jr., M.D.
University of South Carolina School of Medicine, Columbia 29208 (public).	1977	Roderick Macdonald, Jr., M.D.
South Dakota: University of South Dakota School of Medicine, Vermillion 57069 (public).	1907	Karl H. Wegner, M.D.
Tennessee:		
University of Tennessee College of Medicine, Memphis 38163 (public).	1851	E. William Rosenberg, M.D. (acting).
Meharry Medical College School of Medicine, Nashville 37208 (private).	1876	Ralph J. Cazort, M.D.
Vanderbilt University School of Medicine, Nashville 37232 (private).	1873	John E. Chapman, M.D.
East Tennessee State University College of Medcine, Johnson City 37601 (public).	1978	Jack E. Mobley, M.D.
Texas:		
University of Texas Southwestern Medical School, Dallas 75235 (public).	1943	Frederick J. Bonte, M.D.
University of Texas Medical Branch, Galveston 77550 (public)	1887	George T. Bryan, M.D.
Baylor College of Medicine, Houston 77025 (private)	1900	William T. Butler, M.D.
University of Texas Medical School, Houston 77025 (public)	1969	Robert L. Tuttle, M.D.
Texas Tech University School of Medicine, Lubbock 79409 (public).	1969	George S. Tyner, M.D.
University of Texas Medical School, San Antonio 78284 (public).	1968	Stanley E. Crawford, M.D.
Texas A. & M. University, College of Medicine, College Station 77801 (public).	1977	Robert S. Stone, M.D.

ACCREDITED MEDICAL SCHOOLS AND SCHOOLS OF BASIC MEDICAL SCIENCES IN THE UNITED STATES, 1977-78—Continued

Medical schools (ownership)	Year organized	Dean or executive officer
Utah: University of Utah College of Medicine, Salt Lake City 84132 (public).	1905	Cedric I. Davern, Ph. D.
Vermont: University of Vermont College of Medicine, Burlington 05401 (public).	1833	William H. Luginbuhl, M.D.
Virginia:		
University of Virginia School of Medicine, Charlottesville 22901 (public).	1825	Norman J. Knorr, M.D.
Medical College of Virginia, Richmond 23298 (public)	1838	Jesse L. Steinfeld, M.D.
Eastern Virginia Medical School, Norfolk 23501 (private)	1973	Gerald H. Holman, M.D.
Washington: University of Washington School of Medicine, Seattle 98195 (public).	1945	Robert L. Van Citters, M.D.
West Virginia:		
West Virginia University School of Medicine, Morgantown 26566 (public).	1902	John B. Jones, M.D.
Marshall University School of Medicine, Huntington, West Virginia 25701 (public).	1978	Robert W. Coon, M.D.
Wisconsin:		
University of Wisconsin Medical School, Madison 53706 (public).	1907	Lawrence G. Crowley, M.D.
Medical College of Wisconsin, Milwaukee 53233 (private)	1913	Gerald A. Kerrigan, M.D.
Accredited Schools of Basic Medical Sciences		
Minnesota: University of Minnesota School of Medicine, Duluth 55812 (public).	1972	John LaBree, M.D.
Nevada: University of Nevada School of Medical Sciences, Reno 89507 (public).[1]	1967	Thomas J. Scully, M.D. (acting)
Developing Medical Schools—Operational		
Georgia: School of Medicine at Morehouse College, Atlanta 30314 (private).	1978	Louis W. Sullivan, M.D.
Maryland: Uniformed Services University of the Health Sciences School of Medicine, Bethesda 22014 (public).	1976	Jay P. Sanford, M.D.
Nevada: University of Nevada School of Medical Sciences, Reno 89507 (public).	1967	Thos. J. Scully, M.D.
North Carolina: East Carolina University School of Medicine, Greenville, 27834 (public).	1977	Wm. E. Laupus M.D.
Ohio:		
Wright State University School of Medicine, Dayton 45401 (public).	1976	John R. Beljan, M.D.
Northeastern Ohio Universities College of Medicine, Rootstown 44272 (public).	1977	Robt. A. Liebelt, M.D., Ph. D.
South Carolina: University of South Carolina School of Medicine, Columbia 29208 (public).	1977	Roderick Macdonald, Jr., M.D.
Tennessee: East Tennessee State University College of Medicine, Johnson City 37601 (public).	1978	Jack E. Mobley, M.D.
Texas: Texas A. & M. University College of Medicine, College Station 77801 (public).	1977	Robert S. Stone, M.D.
West Virginia: Marshall University School of Medicine Hungtington, West Virginia 25701 (public).	1978	Robert W. Coon, M.D.
Puerto Rico: Catholic University of Puerto Rico Ponce, 00731 (private).	1978	Alfred M. Bongiovanni, M.D.

---

[1] In transition to M.D. degree-granting institution.

AMERICAN MEDICAL ASSOCIATION,
Chicago, Ill., September 28, 1978.

Re Nutrition education in medical schools.

Hon. GEORGE MCGOVERN,
Chairman, Subcommittee on Nutrition, Committee on Agriculture, Nutrition and Forestry, U.S. Senate, Washington, D.C.

DEAR SENATOR MCGOVERN: In conjunction with recent hearings held by the Subcommittee, the American Medical Association takes this opportunity to submit a report on a just completed survey of 124 medical schools regarding the amount of nutrition education in their curricula. This survey was conducted by AMA's Department on Foods and Nutrition.

The survey indicates that significant program efforts are underway in medical schools designed to provide both basic and advanced educational experience and information regarding nutrition in health and medical practice. Furthermore, the report indicates significantly increased activity in this area in the two-year period 1976 through 1978.

We are pleased to note the interest medical school administrators, faculty and students are showing regarding enhanced nutrition education. The survey results indicate the proper recognition by medical schools that nutrition is an important component of both medical training and practice.

The AMA would be pleased to assist the Committee in its efforts concerning the role of nutrition in health and medical practice as well as medical education. We request that the attached report be made part of the official record of the September 20, 1978, hearings held by the Subcommittee.

Very truly yours,

James H. Sammons, M.D.

The Current Status of Nutrition in Medical Curricula: Changes Since the 1976 Survey

SUMMARY

A survey of the 124 accredited United States medical schools was conducted in mid-1978 to determine the status of nutrition teaching in the medical school curriculum. Schools of osteopathy were not included in this survey. The survey did not analyze the quality of the nutrition instruction but did provide information on the amount of nutrition education available to medical students. Of 123 responses, 30 schools (25%) offer a required course in nutrition, eighty-two schools (70%) offer elective courses, 106 (97%) incorporated the teaching of nutrition into other courses and 43 (37%) have clinical nutrition clerkships. One hundred schools (85%) have research opportunities for the students and 58 (50%) offer opportunities for postdoctoral training in nutrition or provide continuing medical education courses. These results demonstrate a significant increase in the amount of nutrition incorporated into the medical school curriculum since 1976.

Introduction

In 1976, the Department of Foods and Nutrition of the American Medical Association, developed a questionnaire to determine the status of nutrition education in medical schools. The questionnaire was mailed to the 114 accredited United States medical schools at the time of the survey. Of 102 responses, it was found that 19 medical schools (19%) offered a required nutrition course; seventy-two (70%) offered electives in nutrition; and 94 (95%) offered nutrition within the framework of other courses. At that time, 27 schools (28%) offered clinical clerkships in nutrition, 81 (80%) offered research opportunities in nutrition and 30 (31%) provided postgraduate or continuing medical education courses in nutrition.

The 1978 survey provided useful information on the current status of nutrition in the medical school curricula and a framework of comparison for any changes as that occurred in the curricula since the 1976 survey.

Method

A questionnaire was mailed in March, 1978 to a contact person involved with nutrition or to the dean of each of the 124 accredited medical schools in the United States. Follow-up questionnaires were mailed in June and August, 1978 to those schools that had not responded to date. The questionnaire sent in August was also followed by a telephone call. Responses were elicited to the following questions:

1. Do you have a required nutrition course, identified as such, in your curriculum?
2. Do you have nutrition courses, identified as such, which can be taken as electives?
3. If you do not have a separate nutrition course, is nutrition incorporated into some other course?
4. Are there any clinical clerkships in nutrition, required or elective, that are available to students?
5. Do students have opportunities for doing nutrition research?
6. Does your institution offer opportunities for postgraduate or continuing medical education studies in nutrition, specifically aimed for physicians?

Results

The six major questions of the survey and their responses are presented in Table 1.

Data were obtained from 123 medical schools; 109 respondents were directly involved with the teaching of nutrition and the remaining 16 originated from the dean's office.

TABLE 1.—SUMMARY OF THE 6 MAJOR SURVEY QUESTIONS AND THEIR RESPONSES

Do you have—	Yes		No (percent)	Number of schools responding
	Number	Percent[1]		
1. Required nutrition course	30	25	88	118
2. Elective nutrition course	82	70	36	118
3. Nutrition incorporated into another course	106	97	3	109
4. Clerkships in nutrition	43	37	74	117
5. Opportunities for students to do nutrition research	100	85	18	118
6. Postgraduate or continuing education studies in nutrition	58	50	57	115

[1] This is a percentage based on the number of positive responses divided by the number of responses to the specific question.

Of the 123 medical schools responding, nine were new schools added since 1976. Four were not included in the tabulation of the data in Table 1 since their curricula had not been totally planned and/or completed. In addition, one response from a medical school was deleted since the information pertained only to the Department of Medicine, not the entire school.

Thirty of the 118 medical schools responding to Question #1 required that the students complete a separate formal course in nutrition. This was frequently taught during the basic science years for a range of 6–46 hours, with 20 hours being the average length of the course. Numerous topics were covered. Most often these courses were known as Nutrition, Principles of Clinical Nutrition and Modern Nutrition in Health and Disease.

Although a majority of the required courses were presented in the basic science years, several schools scheduled courses before clinical clerkships in the third and fourth years. In addition, one medical school offered its course in the third year after the students completed clerkship rotations and another offered its course during the fourth year. These schools indicated that the courses would be more valuable to the student at the later time since the courses would then have more clinical relevance. In addition, one school is currently developing a required course in nutrition and another is considering it.

Of the 118 schools responding to question #2, 82 (70%) offered electives in nutrition. Seventeen of the 82 schools also offered a required nutrition course. These electives were available during various times of the medical school curriculum. The elective courses include: Nutrition in Medical Practices; Issues in Human Nutrition; Evaluation of Exercise and Protein Diets; Obesity; Cultural Factors in Nutrition; Applied Nutrition in Medicine; Diet Therapy; Nutrition in Occupational Health and Safety; Culture, Famine and Diseases; Nutrition, Biochemistry and Aging; Parenteral Nutrition; Metabolic and Nutritional Support of the Intensive Care Patient; Principles of Nutrition; Food Science and Nutrition; Nutrition Component of Human Disease; Clinical Nutrition with a Behavioral Emphasis and Nutrition and Mental Health. These range from 20–40+ hours. In a number of responding medical schools, courses were well accepted by students. Classes may be limited to 15 students or accommodate as many as 50–170 students. Student attendance varies with the courses, lectures and schools. Electives are gaining in popularity and some have been created due to student demand.

Elective courses are based in many departments: Community and Internal Medicine, Pediatrics, Biochemistry, Ob-Gyn, Metabolism and Endocrinology, Pharmacy, Behavioral Science, Community Health and Preventive Medicine, Gastroenterology, Physiology and Nutrition. These courses may also be taught from an interdisciplinary standpoint. Three medical schools indicated electives have not been taken recently due to students' lack of interest and lack of time.

Of the 109 schools responding to question #3, 106 incorporated nutrition into the framework of other courses. Six schools with required courses and three schools with elective courses did not respond to this question as it did not have to be answered. "If you do not have a separate nutrition course, is nutrition incorporated into some other courses?" Of the schools that did respond 22 medical schools with required courses also incorporated nutrition into the framework of other courses. Twenty-six institutions with elective courses also incorporated nutrition into other courses in the medical school curriculum. Fifteen of the 106 schools presented nutrition in the structure of required and elective courses as well as incorporating it into other courses.

Nutrition was presented in as many as 30 different courses and clinical clerkships. the most frequent being Biochemistry, Physiology, Pediatrics, Obstetrics, Medicine, Endocrinology, Gastroenterology and Surgery. Incorporation of nutrition into other courses ranged from a few hours of structured lectures to as much as five weeks of nutrition in a single course. Several schools have documented the total number of hours incorporated into the medical school curriculum along with the concepts persented during these times. The highest number of structured incorporated hours was 124.

Other courses in which nutrition is taught include Pathology; Pharmacology; Preventive Medicine; Hematology; various systems—Cardiovacsular, Nervous, Urinary, Digestive, and Integumentary; Epidemiology and many others. Luncheon conferences and lectures were also incorporated into clinical clerkships: Ob-Gyn, Pediatrics, Surgery, Medicine, Family Practice and Gastroenterology.

Forty-three of 117 schools responding to question 4 offered clinical clerkships in nutrition. These were most often presented as electives. Twelve medical schools with required courses also offered clinical nutrition clerkships. Some of the clerkships involved a preceptorship with a physician in charge of a nutrition consultation service. The student on this rotation was involved with ward rounds, grand rounds, patient work-ups, clinic visits, lectures, and nutritional care of the patient. Other Nutrition Clerkships were presented in conjunction with the following departments: Surgery, Pediatrics, Gastroenterology and Internal Medicine. A few nutrition clerkships involved clinical nutrition research in the United States or overseas. At present there are 7 schools that are developing and initiating new clinical clerkships in nutrition.

One hundred of 112 medical schools responding to question #5 indicated that research opportunities in nutrition were available to students in the basic or clinical sciences. Opportunities in ongoing research include studies of total parenteral nutrition, hyperlipidemias, hospital malnutrition, obesity, amino acid and peptide absorption, bile acid and triglyceride metabolism, alcohol consumption and coronary risk factors, and effects of nutrition on the immune response of the patient with renal carcinoma.

Fifty-eight of 118 schools responding to question #6 indicated that postgraduate or continuing medical education studies in nutrition were available for physicians, These were presented in the format of conferences, grand rounds, or visiting lectureships. Graduate nutrition courses, graduate degrees, fellowships in nutrition, and post-graduate research in nutrition were also available.

Some topics covered in the courses included, Trace Elements in Human Nutrition, Nutrition in the Practice of Medicine, Nutrition Prospectives in Every Day Practice, Vitamins in the Practice of Medicine, Nutritional Support of the Hospitalized Patient, Vitamin E Metabolism and Essential Fatty Acids, Behavioral Aspects of Nutrition, etc. Fellowships were offered in a few institutions in pediatric nutrition, gastroenterology, surgical nutrition, and endocrinology and clinical nutrition.

A total of 9 medical schools indicated a positive response for all 6 questions, while in 1976, five schools had a positive response for all questions. Of the four new medical schools that were not included in the data tabulation, one had an elective course in nutrition, another emphasized nutrition in Biochmeistry and Family Practice and noted that the amount of nutrition would increase with time, and another incorporated nutrition throughout the curriculum and planned to include more.

Trends

The last section of the questionnaire requested information on the trends of nutrition teaching in each institution. As in 1976, one-third of the respondents indicated an increased interest in nutrition on the part of students and faculty. A number of the respondents indicated they were currently evaluating the status of nutrition content in their curriculum through an ad hoc curriculum committee, a nutrition task force, or a nutrition committee in order to determine what was currently being taught and what deficiencies were present. On the basis of this information, the Committee will try to organize a more defined curriculum in nutrition. One-fifth of the schools indicated that they were expanding their programs, and a number of schools indicated that there was an increased emphasis being placed on clinical nutrition. A number of obstacles to establishing or expanding nutrition education in the curriculum were mentioned—the most common being: insufficient funding, lack of qualified faculty in nutrition (M.D., Ph.D.), and an overcrowded curriculum.

Comparison of 1976 and 1978 Results.—In Table II the results of the 1976 and 1978 survey are compared. There was a 6% increase in required courses, no change in elective course offerings, and a 2% increase in schools incorporating more nutrition in their curricula. There was a 9% increase in the number of clinical nutrition clerkships, a 5% increase in nutrition research opportunities and a 19% increase in available postgraduate or continuing medical education studies in nutrition.

TABLE II.—COMPARISON OF 1976 AND 1978 SURVEY RESULTS

[In percent]

Do you have—	1976	1978	Change in
1. Required nutrition course	19	25	+6
2. Elective nutrition course	70	70	----------
3. Nutrition incorporated into another course	95	97	+2
4. Clerkships in nutrition	28	37	+9
5. Opportunities for students to do nutrition research	80	85	+5
6. Postgraduate of continuing studies in nutrition	31	50	+19

In response to our specific questions, sixty-four medical schools added nutrition and 26 schools deleted nutrition from their curriculum. Of the twenty-six schools that deleted nutrition from their curricula, 11 added more nutrition in another manner.

Twenty-five schools had the same responses to the 1978 questionnaire as they gave in 1976. Fourteen of these schools already had extensive programs in nutrition. There was not a change in responses in these schools but a number of them have added more nutrition content. For example, a medical school in 1976 may have had all positive responses to the questionnaire and still had these same positive responses in 1978. Since that time another elective may have been added, but this would not change the actual response to the questionnaire.

Discussion

The results obtained in our 1978 survey demonstrate a definite trend in the incorporation and expansion of nutrition education programs in medical school curricula. More faculty are apparently recognizing the importance of nutrition in medicine and are incorporating it as a specific and identifiable subject.

There was a significant increase in all areas of the study except for the addition of elective courses, the number of which remained the same.

A 19% increase in continuing educational and/or postgraduate course offering for physicians demonstrates an increased interest and concern on the part of physicians and medical faculty. The fact that 64 medical schools actually expanded their nutrition programs was significant. It must be noted that even though twenty-six schools deleted some nutrition from their curriculum, 11 of these added additional nutrition in another form. For example, an elective course was revised and presented as a required course. In addition, differences in responses from two different contacts in 1976 and 1978 at the same medical school, must be taken into consideration. A new contact may not be aware of all nutrition opportunities that are available.

Also, as a curriculum develops, it goes through a process of evolution. Various attempts are made to incorporate nutrition into the curriculum; some successful, others not. If some attempts fail, others are tried. Those attempts that succeed are retained and additional avenues may be explored. Each medical school is unique in itself since each school's program originates from a different department, has a different faculty, is presented in a different format and incorporated into the curriculum in a different manner. A required course does not insure that high quality nutrition is being taught. Some medical schools have extensive nutrition programs that are integrated into a variety of courses in the curriculum. The lecturer identifies the nutrition in the related course and then may point out its clinical relevance. But a required course indicates to the faculty and the student that this subject is important in medical practice. An elective course does not carry the same weight.

CONCLUSION

As previously mentioned, this study clearly establishes that a significant amount of nutrition is taught and that there is a definite trend in nutrition education expansion in medical school curricula. There have been significant increases in the past two years in the quantity of nutrition being presented. Obstacles in the expansion of nutrition in the medical school curriculum include lack of funding, lack of qualified faculty, (M.D.-Ph.D.) and lack of time in an already overcrowded curriculum.

The effective nutrition program in the education of the medical student is coordinated throughout the basic and clinical sciences and emphasizes its clinical application.

[From the Journal of Nutrition Education, Jan.–Mar. 1977]

NUTRITION CONTENT IN MEDICAL CURRICULA: A SURVEY INDICATES THAT NUTRITION TRAINING IS INCREASING IN U.S. MEDICAL SCHOOL CURRICULA

(By Cathy K. Cyborski[1])

SUMMARY

The teaching of nutrition was surveyed at 114 U.S. medical schools. Of 102 responses, 19 schools offer a required course in nutrition, 72 offer electives in nutrition and 94 offer nutrition within the framework of other subject areas. Twenty-seven schools offer clinical clerkships in nutrition, 81 offer research opportunities in nutrition and 30 schools provide postgraduate or continuing studies in nutrition. Although this report does not illustrate the quality of nutrition teaching available, it does give an indication of the formal nutrition education available to medical students.

A SURVEY

This report describes the results of a recent quantitative survey to determine the status of nutrition teaching in U.S. medical schools. Although the study does not analyze the quality of the nutrition instruction, it does give an indication of the formal nutrition education available to medical students.

During 1976, the 114 accredited U.S. medical schools, two of which are 2-year schools of basic medical sciences, were surveyed. A questionnaire was sent to the dean of the school or to a member of the faculty previously identified as being involved in the teaching of nutrition. Data were obtained from 102 responding institutions, 26 of the respondents being from dean's offices and the remaining 76 from those involved with the teaching of nutrition.

SCHOOLS RESPOND

The six major questions of the survey and their responses are summarized in Table 1. Nineteen out of 100 schools responding to question 1 had a separate course in nutrition required of all students. It was usually taught in the basic science years. The courses varied from 10 to 40 hours in length, averaging 20 hours. Various topics were covered including nutrition through the life cycle, the RDA and dietary assessment.

Of the 102 schools responding to question 2, 72 offered electives in nutrition. Fifteen of these 72 schools also offered a required course in nutrition. The electives can be taken by students during various phases of their training. However, a minority of the student body usually chose such an elective.

Ninety-four of 99 schools responding to question 3 presented nutrition within the framework of another course. Nutrition was most often incorporated into biochemistry and was frequently included in physiology, pharmacology and introduction to medicine. Other subject areas within which nutrition was taught were hematology, pathology, preventive medicine, community and environmental medicine, the gastrointestinal system, public health and endocrinology. It was often stated that applicable nutritional principles were also presented in the appropriate clinical clerkships of pediatrics, obstetrics-gynecology, surgery, etc.

---

[1] The author is Nutritionist, Department of Foods and Nutrition, American Medical Association, 535 North Dearborn St., Chicago, Ill. 60610.

Seventeen of the 19 institutions with required nutrition courses incorporated nutrition into other subjects, and 66 of the 72 offering electives in nutrition included nutrition in other courses. Thirteen of the 102 institutions presented nutrition through required and elective courses as well as incorporated into other subjects. Only one school reported that nutrition was not included in its curriculum in any form, although a few years ago there had been a nutrition elective requested by a large number of students.

Twenty-seven of 98 schools responding to question 4 offered nutrition in the form of clinical clerkships, most often as electives. (Clerkships of this kind usually involve a preceptorship with a physician on a nutrition consultation service and include ward rounds, patient evaluation, nutritional care and clinic visits. In some cases, classroom work is also incorporated. Other clerkships would involve research-oriented clinical work in the U.S. or overseas.) Nutrition-related clerkships were often taken in conjunction with other departments such as pediatrics, family practice, community medicine and surgery, or with electives in endocrinology and gastroenterology.

Eighty-one of 101 medical institutions responding to question 5 indicated that students had opportunities for doing research in nutrition, either as a basic or clinical science. Some current research projects included studies on lipids, trace minerals, protein-calorie malnutrition, nutrition and the immune response, and nutrition and pathology.

Thirty of 95 schools responding to question 6 indicated that they provided postgraduate or continuing studies in nutrition. These were presented as visiting lecturers, workshops, seminars, ward rounds, classes or symposia relating to topics, such as nutritional care of the surgical patient, weight control in children and adolescents, and drug-nutrient interaction in the elderly. Some institutions offered fellowships in pediatric nutrition, endocrinology, metabolism and nutrition, gastroenterology and public health nutrition.

TABLE 1.—SUMMARY OF THE SIX MAJOR SURVEY QUESTIONS AND THEIR RESPONSES[1]

Do you have—	Percent Yes	Percent No	Number of schools responding
1. Required nutrition course	19	81	100
2. Elective nutrition course	70	30	102
3. Nutrition incorporated into another course	95	5	99
4. Clerkships in nutrition	28	72	98
5. Opportunities for students to do nutrition research	80	20	101
6. Postgraduate or continuing education studies in nutrition	31	69	95

[1] A list of the schools and their responses is available from the author. Please enclose 46¢ postage of 1st-class return.

THE TREND TO MORE NUTRITION TEACHING

The final section of the survey requested coments on the trends of nutrition teaching in each institution. An increased interest in nutrition by students and faculty was expressed by approximately one-third of the respondents. This increased interest, particularly by the student body, appears to be resulting in more nutrition being incorporated into previously established courses and the instituting of electives dealing with nutrition. Several drawbacks to establishing more nutrition education were indicated, the most common being: lack of funds, lack of clinicians with expertise in nutrition and lack of time in the curriculum.

Once again, it is emphasized that this report illustrated the teaching of nutrition quantitatively and not qualitatively. While the topic of nutrition may be touched upon in a biochemistry course, it may cover only the function of nutrients in metabolism without a discussion of practical applications. Sometimes a required course in nutrition may leave the student confused about the role and importance of nutrition in medicine.

However, several reports have been published that describe successful experiences with nutrition education at specific schools (1–5). An interdisciplinary and comprehensive curriculum design for nutrition education in medical schools has also been proposed (6). Therefore, although much work needs to be done in improving nutrition education in medical schools, about 75% of the medical institutions have given evidence of becoming increasingly aware of this long-standing deficit.

REFERENCES

1. Baumslag, N., K. Gatins, D. Watson and A. Englund, Interdisciplinary nutrition education, J. Med. Ed., 51:64, 1976.
2. Young, E. A. and E. Weser, Integration of nutrition in medical education, J. Nutr. Ed., 7:112, 1975.
3. Flynn, M., D. Keithly and J. Colwell, Nutrition in the education of the family physician, J. Am. Dietet. Assn., 65:269, 1974.
4. Christakis, G., Teaching nutrition in the medical schools, J. Nutr. Ed., 4:141, 1972.
5. Frankle, R. T., E. R Williams and G. Christakis, Nutrition education in the medical school: Experience with an elective course for first-year medical students, Am. J. Clin. Nutri., 25:709, 1972.
6. Frankle, R. T., Nutrition Education in the Medical School: An Analysis of Planning, A Description of Practice, A Proposal for Action, Xerox University Microfilms, Ann Arbor, Michigan, May, 1975.

[From the Journal of the American Medical Association, Jan. 20, 1977]

EDITORIAL: MORE ON NUTRITION IN MEDICAL SCHOOLS

(By Cathy Kapica Cyborski, MS, AMA Department of Foods and Nutrition)

In the November 29 issue of *JAMA* (236:2534, 1976), an editorial, "Nutrition Instruction in Medical Schools: 1976," stated that only 42% of US medical schools offer courses in nutrition. This study was based on the responses from 44 of 60 medical schools surveyed.

In early 1976 a survey of the 114 US medical schools was undertaken by myself to determine the amount of nutrition being taught in the medical school curriculum. From the 102 responses, the following data were obtained: (1) 19% of the medical schools have a required nutrition course; (2) 70% have an elective nutrition course; (3) 95% incorporate nutrition into another course (some schools offer nutrition to the students in two or more of these ways); (4) 28% offer clerkships in nutrition; (5) 80% provide students with opportunities for doing nutrition research; (6) 31% offer postgraduate or continuing education studies in nutrition.

While it is clear that the presence of nutrition teaching does not give any indication of its effectiveness in improving patient care, these results do show that there is more being done in this area than previously believed.

Comments on the trends of nutrition education in each institution were also solicited as part of the survey. Increased student interest in nutrition was prevalent; this was frequently the stimulus for including more nutrition in the curriculum. It was also indicated, though, that there are several drawbacks to instituting nutrition courses, the most common being (1) lack of funds, (2) lack of qualified faculty, and (3) lack of time in the curriculum. Therefore, it seems that solving the deficit of nutrition in medical education should be approached with these three problem areas in mind.

Trying to shame medical schools into teaching nutrition is not the answer. Taking a negative attitude about the lack of nutrition will not provide much long-lasting incentive either. Improvement can best be encouraged by providing models that do work and means that can be taken and are being take to bring about increased effectiveness in this area.

The Department of Foods and Nutrition of the American Medical Association sponsors several programs to improve nutrition education in medicine. The Joseph Goldberger Visiting Professors in Clinical Nutrition Program makes available to approximately 30 medical schools each year the opportunity to invite a physician with expertise in nutrition to visit their institution. During this visit of one to two days, the visiting professor participates in such activities as medical school lectures, grand rounds, seminars, and conferences. This program is very flexible in that it allows each institution to choose a speaker that would best complement its nutrition needs. The AMA provides the visiting professor with expenses and an honorarium.

The Joseph Goldberger Scholarship in Clinical Nutrition Program provides third and fourth year medical students with an opportunity to do a nutrition clerkship at a US medical institution that has such an elective already established. The clerkships may be taken any time throughout the year for a period of four to eight weeks. The AMA provides the student with living and travel expenses.

In addition, the Department also collects outlines and syllabuses from medical school courses on nutrition and sponsors conferences to discuss nutrition education, eg, the 1972 Williamsburg Conference.

Although many other organizations and institutions are attempting to combat this educational deficit in medicine, there is much work that needs to be done in this area. For an increase in the quantity and quality of nutrition in medical education to occur, we need to build on the foundations that are already present.

SUMMARY OF NUTRITION CURRICULA IN MEDICAL EDUCATION SURVEY, 1976

(Compiled by Cathy Kapica Cyborski, M.S., Department of Foods and Nutrition, American Medical Association 1976)

Question No. 1. Do you have nutrition courses in your curriculum which are required?

Question No. 2. Do you have nutrition courses available which can be taken as electives?

Question No. 3. Is nutrition incorporated into some other course?

Question No. 4. Are there any clerkships in nutrition, required or electives, that are available for students?

Question No. 5. Do students have opportunities for doing nutrition research?

Question No. 6. Does your institution offer opportunities for postgraduate or continuing education studies in nutrition?

NOTE: "Comments" are those made by the respondent at each school.

SURVEY OF NUTRITION CURRICULA IN MEDICAL EDUCATION, 1976

School/contact	Question						Comments
	1	2	3	4	5	6	
1. University of Alabama/Birmingham, C. E. Butterworth, Jr., M.D., professor of medicine and pediatrics.	Yes	Yes	Yes	Yes	Yes	Yes	Increased interest in nutrition of patient in hospital by students and housestaff but administrators lagging behind; increased demand may increase risks of unqualified persons teaching.
2. University of South Alabama/Mobile, Nestor Flodin, Ph. D., professor of biochemistry.	No	Yes	Yes	No	Yes	No	Continuing medical education studies being developed; lack of nutrition-oriented clinicians is an important obstacle.
3. University of Arizona/Tucson, Louis Kettel, M.D., associate dean.	Yes	Yes	Yes	No	Yes	No	Nutrition teaching at the school is stable.
4. University of Arkansas/Little Rock, Horace Marvin, Ph.D., associate dean for academic affairs.	No	No	Yes	No	Yes	No	Curriculum committee considering introducing an elective for 2d, 3d, and 4th-year students.
5. University of California/Davis, Robert Hodges, M.D., professor of internal medicine.	Yes	Yes	(1)	Yes	Yes	Yes	Nutrition will be increasing in importance in medicine but presently it still lacks a clearly defined identity; should be recognized as a specialty or subspecialty.
6. University of California/Irvine, Timothy Crocker, M.D., chairman, department of community and environmental medicine.	No	No	Yes	No	No	No	No sepatate course planned but nutrition to be expanded in community medicine course from 4 to 16 hours; student interest and requests caused increased attention.
7. Loma Linda University—California, Ulma Register, Ph. D., professor and chairman, department of nutrition.	Yes	Yes	Yes	No	No	No	Increased interest; need M.D. nutritionist; nutrition taught under title of "Preventive Medicine."
8. University of California/Los Angeles, R. B. Alfin-Slater, Ph. D., professor of nutrition and biochemistry.	No	Yes	Yes	No	Yes	Yes	Students are requesting more nutritional input; continuing medical education at school of public health.

See footnote at end of table.

SURVEY OF NUTRITION CURRICULA IN MEDICAL EDUCATION, 1976—Continued

School/contact	Question						Comments
	1	2	3	4	5	6	
9. University of Southern California/Los Angeles, Jean L. Mowbray, administrative assistant.	Yes	Yes	Yes	No	Yes	Yes	Increased interdisciplinary expansion of nutrition; expanding in area of postgraduate medical education.
10. Stanford University/Palo Alto, Calif., Keith Taylor, M.D., Professor of medicine.	Yes	Yes	(1)	No	Yes	No	Increase in nutrition is the trend.
11. University of California/San Diego, Elizabeth Barrett-Connor, M.D., associate professor of epidemiology and medicine.	No	Yes	No	No	Yes	No	Recently put in a request for a nutritionist on the faculty.
12. University of California/San Francisco, Malcolm Holliday, M.D., professor of pediatrics.	No	Yes	Yes	No	No	No	Much student interest in nutrition but course content is poor and often biased; need for more clinical application.
13. University of Colorado/Denver, H. Peter Chase, M.D., associate professor of pediatrics.	No	Yes	Yes	Yes	Yes	No	Increased student interest; M.D. or Ph. D. needed in medical school to teach nutrition because students don't accept major teaching from individuals not at this level.
14. University of Connecticut, Robert Scheig, M.D., professor of medicine.	No	Yes	Yes	No	Yes	No	Nutrition taught mostly in GI; they have had input into the training of dietitians.
15. Yale University/New Haven, Conn., Gerald Klatskin, M.D., professor of medicine.	No	No	No	No	No	No	Several years ago had an elective in nutrition which a large number of students requested—but no longer have one.
16. Georgetown University/Washington, D.C., Aaron Altschul, Ph. D., professor of nutrition.	No	Yes	Yes	No	Yes	No	Nutrition teaching is well-supported throughout the school.
17. George Washington University/Washington, D.C., L. Thompson Bowles, M.D., Ph. D., acting dean for academic affairs.	No	Yes	Yes	No	Yes	No	More educational opportunities are becoming available.
18. Howard University/Washington, D.C., Eleanor Franklin, Ph. D., associate dean, academic affairs.	No	Yes	Yes	No	No	(1)	Although curriculum committee has addressed need for more nutrition, this is low on faculty priorities.
19. University of Florida/Gainesville, William Deal, M.D., associate dean	No	Yes	Yes	No	Yes	Yes	Nutrition is included in nearly all aspects of clinical teaching and has always been a part of the curriculum; interest is increasing.
20. University of Miami/Florida, Anthony Soldo, Ph. D., associate professor of biochemistry.	No	No	Yes	No	No	No	Department of biochemistry taking steps to increase nutrition teaching in cooperation with the department of epidemiology and the department of public health.
21. University of South Florida/Tampa, Lewis A. Barness, M.D., chairman, department of pediatrics.	No	No	Yes	(1)	Yes	(1)	Nutrition teaching increasing.
22. Emory University/Atlanta, Ga., Kay Gatins, associate, department of preventive medicine and community health.	Yes	No	Yes	No	Yes	No	No nutrition up to 3 years ago when got faculty member with nutrition interest; now faculty member gone and a replacement is needed.
23. Medical College of Georgia/Augusta, Elaine B. Feldman, M.D., professor of medicine.	No	Yes	Yes	Yes	Yes	No	Modest recognition of importance; minimal institutional support.
24. University of Hawaii/Honolulu, W. Stanley Hartroft, M.D., Ph. D., professor of pathology.	No	No	Yes	No	Yes	No	Nutrition "doesn't seem to be going anywhere very fast."
25. Chicago Medical School—Illinois, Lawrence Hirsch, M.D., chairman, department of family medicine.	No	No	Yes	No	No	No	Minimal mentioned in biochemistry; considering elective and possibly required course in nutrition.
26. Northwestern University/Chicago, Ill., Norbet Feinkel, M.D., director, center for endocrinology, metabolism and nutrition.	No	Yes	Yes	Yes	Yes	Yes	Trend is toward getting full-time faculty and making nutrition required.
27. Loyola University/Chicago, Ill., Mary Druse Monteuffel, Ph. D, department of biochemistry.	No	Yes	Yes	No	Yes	No	Increasing interest among entering medical students for nutrition information.
28. Rush Medical College/Chicago, Ill., Dorice M. Marins, Ph. D., associate professor of clinical nutrition	Yes	Yes	Yes	No	No	No	Increased interest and teaching, however are short of nutrition staff; anticipate increased incorporation of nutrition into other courses.
29. University of Chicago—Illinois, Irwin Rosenberg, M.D., professor of medicine.	No	Yes	Yes	No	Yes	Yes	Increased awareness by students and faculty not yet reflected in curriculum development.

See footnote at end of table.

SURVEY OF NUTRITION CURRICULA IN MEDICAL EDUCATION, 1976—Continued

School/contact	Question						Comments
	1	2	3	4	5	6	
30. University of Illinois/Chicago, W.A. Reynolds, Ph. D., professor of anatomy.	Yes	No	Yes	No	Yes	No	Nutrition course 4 years old; considered successful and well received. Working on more nutrition in clinical years.
31. Southern Illinois University/Springfield, Judy Wilcox, R.D., clinical nutritionist.	Yes	No	Yes	Yes	Yes	No	Nutritionists working with school of medicine 1½ years only, but have been well received; much work needs to be done yet.
32. Indiana University/Indianapolis, Philip Christiansen, M.D., professor of medicine.	No	No	Yes	No	Yes	Yes	No comments.
33. University of Iowa/Iowa City, Barry Bratton, Ph. D., director, Hill Family Foundation.	No	Yes	Yes	No	Yes	Yes	Nutrition available mostly in pediatrics; at present there are no plans to change approach to teaching nutrition.
34. University of Kansas/Kansas City, Mary Carey, Ph. D., R.D., Department of dietetics and nutrition.	No	Yes	Yes	No	No	No	Students and house staff interested in nutrition; faculty and house staff supportive in expanding curricula.
35. University of Kentucky/Lexington, Dr. Paul Thornton, office of student services.	No	Yes	Yes	No	(1)	(1)	Increased student interest but have decreasing resources.
36. University of Louisville—Kentucky; Calvin Lang, Sc. D., professor of biochemistry.	No	No	Yes	No	Yes	No	Trying to develop continuing medical education programs in nutrition; increased demand for nutrition knowledge; more teaching of the subject needed.
37. Louisiana State University/New Orleans, Alfredo Lopez, M.D., Ph. D., director, nutrition division.	No	Yes	Yes	Yes	Yes	Yes	They have a nutrition division under the Department of medicine which acts as a nucleus for nutrition teaching and consulting; will share experiences with other schools developing programs.
38. Tulane University/New Orleans, Edward Peebles, Ph. D., assistant dean for student affairs.	No	Yes	Yes	No	Yes	No	Used to be better before the death of a professor but are now trying to build up representation in school of medicine.
39. Louisiana State University/Shreveport, Charles D. Wood, Ph. D., associate dean.	No	No	Yes	No	Yes	No	The only nutrition available (besides possibly incorporated into biochemistry) is as a graduate school research project.
40. Johns Hopkins University/Baltimore, Md., Gerald Gottener, M.D., Ph. D., dean for predoctoral programs.	No	Yes	Yes	No	Yes	Yes	Small number (1–5) take elective; nutrition is taught in school of public health; increasing attention being given to nutrition in biochemistry.
41. University of Maryland/Baltimore, Marvin Cornblath, M.D., Professor and head, department of pediatrics.	No	Yes	Yes	No	Yes	No	More interest in nutrition by students; students want clinical applications so course being developed, particularly in pediatric nutrition.
42. Boston University—Massachusetts, Joseph Vitale, Sc. D M.D., professor of pathology.	Yes	Yes	Yes	(1)	Yes	(1)	They have a M.D.-Ph.D. program in human and clinical nutrition.
43. Harvard Medical School/Boston, Mass., Robert S. Blacklow, M.D., associate dean, academic programs.	(1)	Yes	(1)	Yes	Yes	No	Nutrition is more popular.
44. Tufts University/Boston, Mass., Jane Gaudette Jones, Ph. D., assistant dean for educational affairs.	No	Yes	Yes	Yes	Yes	Yes	Trying to include more nutrition but need money so are writing grant proposals.
45. University of Massachusetts/Worcester, J. F. Flatt, Ph. D., professor of biochemistry.	No	No	Yes	No	Yes	No	Nutritional support team being developed in hospital which may lead to availability of more learning opportunities.
46. University of Michigan/Ann Arbor, Arthur French, M.D., professor of medicine.	No	Yes	Yes	Yes	Yes	No	Decreasing priority is being given to nutrition and it is increasingly difficult to maintain collaborative efforts to teach nutrition in medical and public health schools.
47. Wayne State University/Detroit, Mich., W. E. Rush, M.D., associate dean for curricular affairs.	No	Yes	Yes	Yes	No	No	Nutrition teaching inadequate at present time.
48. Michigan State University/East Lansing.	No response						
49. Mayo Medical School/Rochester, Minn., Ralph A. Nelson, M.D., Ph. D., chairman, section of nutrition.	Yes	Yes	Yes	Yes	Yes	Yes	Nutrition incorporated in curriculum since beginning of the school; It is very popular.

See footnote at end of table.

SURVEY OF NUTRITION CURRICULA IN MEDICAL EDUCATION, 1976—Continued

School/contact	Question 1	2	3	4	5	6	Comments
50. University of Minnesota/Duluth, Paul Anderson, Ph. D., head, department of biochemistry.	No	No	Yes	(1)	No	No	This is a 2-year school of basic sciences slowly increasing nutrition class work and personnel.
51. University of Minnesota/Minneapolis, Robert McCollister, M.D., associate dean.	No	Yes	Yes	No	Yes	No	Students seldom take elective; not much change in the number of courses over the last 5 years.
52. University of Mississippi/Jackson, Charles Dodgen, Ph. D., associate professor of biochemistry.	No	Yes	Yes	No	No	No	This is the 1 year the elective will be taught; therefore, interest is on the upswing.
53. University of Missouri/Columbia, Margeret Flynn, Ph. D., professor of nutrition.	No	No	No	No	Yes	Yes	While competent nutritionists are available, they are rarely asked to patricipate in undergraduate area. Emphasis is now on resident training in family practice section.
54. University of Missouri/Kansas City, Charles Wilkinson, M.D., chairman on curriculum.	Yes	No	Yes	No	No	No	Nutrition electives being developed; too early to determine its impact.
55. St. Louis University—Missouri, M. K. Horwitt, Ph. D., professor of biochemistry.	No	Yes	Yes	Yes	Yes	Yes	There is a genuine interest in increased nutrition; request for funds sent to HEW.
56. Washington University/St. Louis, Mo.	No response						
57. Creighton University/Omaha, Nebr., Dr. M. J. Severin, assistant dean.	No	No	Yes	No	Yes	No	Slowly developing nutrition in curriculum; has faculty interest and hope to increase emphasis.
58. University of Nebraska/Omaha, F. F. Paustian, M.D., professor of medicine.	No	No	Yes	No	Yes	No	Proposing for establishment of division of nutrition education.
59. University of Nevada/Reno, Ronald S. Pardini, Ph. D., chairman, department of biochemistry.	No	No	Yes	No	Yes	No	This is a 2-year school of basic sciences; need considerably more nutrition input.
60. Dartmouth Medical School/Hanover, N.H., Lester Salano, M.D., associate professor of medicine.	No	No	Yes	No	Yes	No	Slowly developing awareness for the need of nutrition.
61. College of Medicine and Dentistry of New Jersey/Newark, Thomas Orr, office of education.	(1)	Yes	Yes	Yes	Yes	(1)	No comments.
62. College of Medicine and Dentistry of New Jersey/Rutgers—Piscataway, Howard Jacobson, M.D., professor of community medicine.	No	Yes	Yes	Yes	No	Yes	Importance of nutrition recognized yet whole area of hospital centered dietary services has been neglected.
63. University of New Mexico/Albuquerque, George M. Owen, M.D., director, clinical nutrition program.	No	Yes	Yes	Yes	Yes	No	Clinical nutrition program to withdraw from teaching undergraduate dietetics and focus more on graduate level.
64. Albany Medical College/Albany, N.Y., Lyn Howard, M.B., director, nutrition program.	Yes	Yes	Yes	Yes	Yes	Yes	Are aiming nutrition teaching to be geared more toward clinical aspects.
65. State University of New York at Buffalo, Lee Bernardis, D. Phil., Ph. D., resident professor of surgery.	No	Yes	Yes	No	No	No	Urges that incorporation of nutrition into curriculum be mandatory for accreditation.
66. Columbia University College of Physicians and Surgeons/New York, N.Y., Jo Anne Braseo, M.D., associate professor of pediatrics.	Yes	Yes	Yes	Yes	Yes	Yes	No comments.
67. Cornell University/New York, N.Y., Thomas Meikle, Jr., M.D., associate dean.	No	Yes	Yes	No	Yes	No	Faculty has considered including nutrition in curriculum but it was never implemented.
68. Albert Einstein College of Medicine of Yeshiva University/New York, N.Y., Laurence Finberg, M.D., professor of pediatrics.	No	Yes	Yes	No	Yes	No	More formal stress on specific nutrition content the last few years.
69. Mount Sinai/New York, N.Y., Roy Brown, M.D., associate professor of community medicine.	No	Yes	Yes	Yes	Yes	Yes	Student interest high but due to decreased financial support cannot move ahead with plans.
70. New York Medical College/New York, N.Y., Jack Cooperman, M.D., associate professor of pediatrics.	Yes	Yes	Yes	Yes	Yes	No	Their plan for nutrition education will be implemented as of September 1976, with help of HEW grant; problem is in obtaining a physician good in clinical nutrition.
71. New York University/New York, N.Y.	No response						

See footnote at end of table.

SURVEY OF NUTRITION CURRICULA IN MEDICAL EDUCATION, 1976—Continued

School/contact	Question 1	2	3	4	5	6	Comments
72. State University of New York/Brooklyn (downstate).	do.						
73. University of Rochester—New York, Robert Campbell, M.D., associate professor of medicine.	Yes	Yes	No	Yes	Yes	No	No comments.
74. State University of New York/Stony Brook, Dr. Roger Cohen, associate dean.	No	Yes	No	No	No	No	Do.
75. State University of New York/Syracuse, W. W. Westerfeld, Ph. D., department of biochemistry.	Yes	Yes	Yes	No	Yes	No	Nutrition was in biochemistry course but now is separate entity, although it is very short and basic; clinicians reluctant to get involved.
76. University of North Carolina/Chapel Hill.	No response						
77. Duke University/Durham, N.C.	do.						
78. Bowman-Gray/Winston-Salem, N.C., Cornelius F. Strittmatter, Ph. D., chairman, department of biochemistry.	No	No	Yes	No	No	No	Deficiency in nutrition recognized but lack of strong nutrition advocate and competing demands of other special interests resulting in situtations not being remedied.
79. University of North Dakota/Grand Forks, Harold Sandstead M.D., director, USDA-ARS.	No	Yes	Yes	No	Yes	No	Newly established nutrition division in department of medicine; moving ahead gradually in nutrition field.
80. University of Cincinnati—Ohio, Charles E. Kiely, Jr., M.D., associate dean.	No	Yes	Yes	No	Yes	No	The subject seems to get covered by several basic science and clinical departments rather than by itself.
81. Case-Western Reserve University/Cleveland Ohio, Janice Neville, chairman, department of nutrition.		Yes	Yes	Yes	Yes	Yes	Elective time has expanded but nothing formal in core curriculum yet.
82. Ohio State University/Columbus	No response						
83. Wright State University of Ohio/Dayton.	do.						
84. Medical College of Ohio/Toledo, Calvin Long, Ph.D., associate professor of biochemistry and surgery.	No	No	Yes	No	No	Yes	Increasing interest in nutrition; considering additional nutrition instruction.
85. University of Oklahoma/Oklahoma City, Kelly West, M.D., professor of medicine.	No	Yes	Yes	No	Yes	No	Plan to improve nutrition teaching; grant requests have been made.
86. University of Oregon/Portland, Banoon M. Jhaveri, M.D., assistant professor of pediatrics.	No	Yes	Yes	No	Yes	Yes	Plan to have clerkships next year; positive trend toward increased nutrition education.
87. Pennsylvania State University/Hershey, Sachiko St. Jeor, R.D., M.S., department of behavioral sciences.	No	Yes	Yes	No	Yes	Yes	Are developing program for teaching nutrition in an interdisciplinary environment.
88. Hahnemann Medical College/Philadelphia, Pa., Gert Jacobsohn, Ph. D., professor of biochemistry.	No	Yes	Yes	No	Yes	No	Increased interest but not much increase in number of teaching hours; need permanent nutrition course; elective reaches about a ninth of the class.
89. Jefferson Medical College/Philadelphia, Pa., Wendelyn Mead, R.D., department of community health and preventive medicine.	No	Yes	Yes	No	No	No	Increased nutrition integration into curriculum with good response but support from curriculum committee poor.
90. Medical College of Pennsylvania/Philadelphia, Mary Ellen Hartman, M.D., associate dean.	No	Yes	Yes	No	Yes	No	Nutrition more visible in curriculum; increased emphasis in clinical aspects.
91. Temple University/Philadelphia, Pa., Hugo Dunlap Smith, M.D., associate dean, curriculum.	No	Yes	Yes	No	Yes	Yes	Curriculum revised in 1975 to give more emphasis to nutrition for 1st-year students.
92. University of Pennsylvania/Philadelphia, Alfred Bongiovanni, M.D., professor of pediatrics.	Yes	Yes	Yes	Yes	Yes	No	The present programs are new and will gradually evolve.
93. University of Pittsburgh—Pennsylvania, A. E. Axelrod, Ph. D., professor of biochemistry.	No	Yes	Yes	No	Yes	Yes	Increased need for instruction recognized but little is being done.
94. Brown University/Providence, R.I., Paul Fenton, Ph. D., professor of biology.	No	Yes	Yes	No	Yes	Yes	Plans have been formulated for integrated programs of nutrition education and research for undergraduate, graduate, medical, and postdoctoral students.
95. Medical University of South Carolina/Charleston, John Colwell, M.D., Ph. D., professor of medicine.	No	Yes	Yes	Yes	Yes	No	This is a new program to be implemented beginning July 1976 with the aid of a Federal grant.
96. University of South Dakota/Vermillion, Otto Neuhaus, Ph. D., chairman, department of biochemistry.	No	No	Yes	No	Yes	No	No serious change in nutrition teaching anticipated; may improve nutrition already given and increase symposia and panel discussions.

SURVEY OF NUTRITION CURRICULA IN MEDICAL EDUCATION, 1976—Continued

School/contact	Question						Comments
	1	2	3	4	5	6	
97. University of Tennessee/Memphis, Robert Taylor, Jr., Ph. D., associate dean.	No	Yes	Yes	No	Yes	No	They are trying to correct a longstanding nutrition deficit but progress is slow.
98. Meharry Medical College/Nashville, Tenn.	No response						
99. Vanderbilt University/Nashville, Tenn., George V. Mann, M.D., career research professor.	No	Yes	Yes	No	Yes	Yes	Increasing interest in nutrition.
100. University of Texas/Southwestern-Dallas.	No response						
101. University of Texas/Galveston, George Bryan, M.D., associate dean for curriculum affairs.	No	No	Yes	No	Yes	(1)	Each department responsible separately for teaching nutrition.
102. Baylor College of Medicine/Houston, Tex., Buford Nichols, M.D., associate professor of pediatrics.	Yes	Yes	Yes	Yes	Yes	Yes	Grant applied for to increase nutrition education in all aspects of curricula.
103. University of Texas/Houston	No response						
104. Texas Tech University/Lubbock, Anthony Way, M.D., Ph.D.	No	No	Yes	No	No	No	Newly established school and it has not had time for the setting of trends; nutrition is incorporated in family practice residency.
105. University of Texas/San Antonio, Eleanor Young, Ph. D., associate professor of medicine.	No	Yes	Yes	Yes	Yes	Yes	Over the past 6 years they have developed a nutrition program; have continued to expand and strengthen.
106. University of Utah/Salt Lake City, George E. Cartwright, M.D., chairman, department of medicine.	No	Yes	Yes	(1)	Yes	(1)	Minimal program in nutrition.
107. University of Vermont/Burlington, Elliott Danforth, M.D., assistant professor of medicine.	No	No	Yes	Yes	Yes	Yes	More emphasis in nutrition by incorporating into other courses and having symposia.
108. University of Virginia/Charlottesville, Munsey Wheby, M.D., professor of medicine.	No	No	Yes	No	Yes	No	Increasing interest in nutrition with administrative cooperation; money is the problem; have applied for grant.
109. Medical College of Virginia/Richmond, Charles Clayton, Ph. D., professor of biochemistry.	No	No	Yes	No	Yes	No	Importance of nutrition realized; yet, enough time is available in the curriculum.
110. Eastern Virginia/Norfolk, Karl Schellenberg, M.D., Ph. D., chairman, department of biochemistry.	No	No	Yes	No	Yes	No	The amount of practical nutrition in biochemistry curriculum is being increased.
111. University of Washington/Seattle, Nathan Smith, M.D., professor of pediatrics.	No	Yes	Yes	No	Yes	No	Presently a committee is evaluating the nutrition education programs available at the school; anticipated the development of a meaningful program within 2–3 years.
112. University of West Virginia/Morgantown, Dennis Pontom, Ph. D., assistant professor of biochemistry.	No	Yes	Yes	No	Yes	No	More student interest; would like formal nutrition course but due to lack of time and other factors, this is not yet possible.
113. University of Wisconsin/Madison, Thomas Meyer, associate dean.	No	No	Yes	No	No	No	Much talk—not much action; if someone could put "pizzaz" into subject, would have less problems with acceptance.
114. Medical College of Wisconsin/Milwaukee, Sidney Shindell, M.D., department of preventive medicine.	No	No	Yes	No	Yes	No	Increased attention to nutrition within broader topic of health maintenance.

---

[1] Denotes question was not answered.